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ERRATUM.

No. 4, p. 264, four lines from end of NYASALAND PROTECTORATE summary, for "in a part of the same area," read "in the fly country below Kasu Hill (Proclaimed Area of Dowa District)."

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TROPICAL DISEASES BUREAU.

TROPICAL DISEASES
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1916.

[No. 1.]

KALA AZAR.

NICOLLE (Charles). **Chronique du Kala-Azar en Tunisie.**—*Bull. Soc. Path. Exot.* 1916. Mar. Vol. 9. No. 3. pp. 126-129. With 1 fig., and *Arch. Inst. Pasteur de Tunis.* 1916. April 1. Vol. 9. No. 3. pp. 176-179.

In continuation of his paper in the *Bulletin de la Société de Pathologie Exotique*, June 1914 [this *Bulletin*, Vol. 4, p. 394] the author records the occurrence in Tunis of seven further cases of kala azar in children. Thirty-eight were previously chronicled so that the total number observed by him in eight years is 45. The disease is unknown below the age of six months and above ten years. It is commonest from the first to the third year (27 out of 45 cases). Boys are more frequently affected than girls (28 boys, 17 girls). Italians predominate (35 cases out of 45).

Referring to cultures of leishmania the author remarks that a culture of *L. tropica* isolated in November 1909 was found to be contaminated by a bacterium at its 135th subculture. This was kept going for 21 further subcultures. The growth of the parasite was normal and abundant in spite of the contamination as long as the temperature was maintained at 18 to 20°. But when the temperature was raised the bacteria gained the supremacy. The leishmania were regained in a state of purity by a human inoculation.

The author again calls attention to cases of anaemia with enlargement of the spleen in children, symptomatically similar to kala azar but in which spleen puncture shows neither leishmania nor other parasites. He points out that the number of cases observed is about equal to those of kala azar, that, in contradistinction to this disease, it may occur below the age of six months and that the spleen is markedly hard. This hardness may be apparent on palpation, but is very evident on puncturing the organ, on account of the resistance offered to the needle. The majority of patients are non-Italians, the reverse being the case in kala azar. The prognosis is less unfavourable than in the latter disease, the majority appearing to recover.

E. J. Wyler.

BOUILLIEZ (M.). **Un cas de kala-azar infantile au Moyen-Chari (Territoire du Tchad).**—*Bull. Soc. Path. Exot.* 1916. May. Vol. 9. No. 5. pp. 299-302. With 1 fig.

This is an account of a case of kala azar in a native child, about six years of age. It was probably infected in the Chad (West Africa) district and is of interest as the first one recorded in that locality. No spleen puncture was made, but the parasites were found in large mononuclear cells in the peripheral blood.

E. J. W.

i. ARAVANDINOS (Anast.). **Contribution à l'histoire de la leishmaniose interne.**—*Bull. Soc. Path. Exot.* 1916. Jan. Vol. 9. No. 1. pp. 10-13.

ii. LAVERAN (A.). **Au sujet de l'histoire de la leishmaniose viscérale.**—*Ibid.* Feb. No. 2. pp. 74-75.

i. The author, writing from the University of Athens, claims that kala azar was described as a clinical entity in Greece, several decades before accounts of the disease in India were published.

In support of this contention he points out that in 1835 a Greek physician reported the existence of splenomegaly in children in the island of Spezzia, and that other cases have since been reported from there and from the island of Hydra.

ii. This paper is a reply to the above claim. It is remarked that confusion may have occurred between cases of enlarged spleen not due to leishmania and cases of kala azar and that there have been reported from Greece by Dr. ARAVANDINOS (and from Tunis by Dr. NICOLLE) cases of splenic enlargement, identical with infantile leishmaniasis but not due to *L. donovani*.

He remarks that it is the discovery by LEISHMAN and DONOVAN of *Leishmania donovani* which has enabled the history of the splenomegalies to be elucidated and has established a morbid entity characterised by the presence of their parasite.

He concludes by justly stating that the discovery of visceral leishmaniasis must be attributed to LEISHMAN and DONOVAN and that it can only be *inferred* from the work of the Greek physicians that the disease has probably been rife, in the past, in the islands of Hydra and Spezzia.

E. J. W.

ARAVANDINOS (Anast.). **L'anatomia patologica e l'istopatologia di un caso greco di leishmaniosi interna.** [Anatomy and Histopathology of a Case of Internal Leishmaniasis from Greece.]—*Malaria e Malat. d. Paesi Caldi.* 1916. Apr. 20. Vol. 7. No. 2. pp. 79-83.

Notes of the post-mortem examination of a child who died from leishmaniasis, presenting nothing of general interest. There has been, however, only one previous record of a post-mortem from Greece, which is the excuse for publishing this one.

J. B. Nias.

MARTINEZ (Fidel F.). **El Kala-azar infantil en lo peninsula Iberica.** [Infantile Leishmaniasis in Spain.]—*Arch. Brasileiros de Med.* 1915. Nov. Vol. 5. No. 11. pp. 392-422.

Infantile leishmaniasis has only been recognised in Spain during the last few years, having been first described by PITTALUGA in 1912. Following up the discovery, the author of the present paper has been searching for fresh cases in that part of the Iberian peninsula which is nearest to the Algerian coast, namely, the territory comprised between the foothills of the Sierra Nevada and the coast-line between Malaga and Almeria. Cases of the disease are found to be common in this region. The inhabitants, on account of their poverty, are in the habit of migrating, with their families, in search of work and in this way the disease has probably been imported into Spain. Many of them also go to South America with the same object, so that there is every probability that ultimately infantile leishmaniasis will be introduced into Brazil through this channel. The greater part of the paper is taken up with a systematic account of the disease, for the benefit of Brazilian practitioners who are as yet not practically acquainted with it.

J. B. N.

- i. ROGERS (Leonard). **Preliminary Note on the Treatment of Kala-Azar by Tartar Emetic Intravenously, and Inunctions of Metallic Antimony.**—*Indian Med. Gaz.* 1915. Oct. Vol. 50. No. 10. pp. 364-365.
- ii. ——— & HUME (N. H.). **The Treatment of Kala-Azar (Indian Form) by Tartar Emetic Intravenously and by Inunctions of Metallic Antimony.**—*Brit. Med. J.* 1916. Feb. 26. pp. 301-303.
- iii. MUIR (E.). **The Treatment of Kala-Azar with Tartar Emetic.**—*Indian Med. Gaz.* 1915. Oct. Vol. 50. No. 10. pp. 365-368.

i. The author records his general impressions of the treatment, derived from an experience extending upwards of four months.

The result in all cases which had been under treatment for more than two months are summarised as follows :—

Results in Cases under Treatment for over Two Months.

Cases.				Complications.
Much improved ..	..	6		
Improved ..	..	2		Cancrum oris 1.
No change ..	..	1		
Worse ..	..	3		Cancrum oris 2, bacillary dysentery 1.
Died ..	..	1		Ascites, dysentery, and broncho-pneumonia.

"When it is taken into account that the class of cases admitted to hospital are usually in a very advanced stage of the disease and the frequency of serious complications in the series these results are distinctly promising."

In all cases the diagnosis was verified by spleen puncture. The action of the drug is considered to be probably on the parasites themselves and therefore specific.

In young children, inunctions of five per cent. finely divided metallic antimony in the form of an ointment were tried on account of the disadvantages of the intravenous route. The author does not consider his observations upon this method to be sufficiently advanced to justify conclusions. He suggests that Trixidin (antimony trioxide) might be similarly used as it is said to have been beneficial in sleeping sickness.

ii. Six unselected cases of kala azar in Europeans treated by intravenous injections of tartar emetic are recorded. Parasites were found by spleen puncture in all.

The technique of the injections and dosage was as follows :—

"The technique of the injections is very simple. A 10 ccm. serum syringe is used, and the vein selected—usually either the median basilic or cephalic, or a prominent vein in the forearm—is made to stand out by tying a bandage round the upper arm, and by the patient clenching his fist. Tr. iodine is used to sterilize the skin. As soon as it is thought that the needle is in the vein the piston is withdrawn slightly, and a little blood is drawn up into a syringe; or, if a syringe of the solution is to be given, the barrel is removed from the needle and a few drops of blood are allowed to flow before the solution is injected. Great care should be taken that the injection is made into the vein, and not into the tissues around the vein. The tartar emetic solution is very irritating, and a few minims injected under the skin cause great pain at the time of the injection, and later on a hard, tender, brawny swelling, or even sloughing of the tissues.

"The symptoms which follow the injections have varied in different cases. Three patients had no untoward symptoms—one experienced a metallic taste in his mouth for several hours, a disinclination for food and vague abdominal discomfort. Another had a severe paroxysm of coughing and vomiting, which came on immediately after the injection, and lasted about ten minutes."

The dosage was as follows :—

"We began with only half to 1 ccm. of the 2 per cent. solution, but rapidly increased it to 3 or 4 ccm. and repeated the injection every two or three days, adding 1 ccm. at each injection up to a maximum of 10 ccm. if the patient had no marked gastric disturbance, in which case the dose may be reduced slightly for a time. In no case have any serious symptoms developed, although we have repeatedly given the large dose of 20 cc."

The authors unhesitatingly advise the use of intravenous injections of tartar emetic as a routine method of treating kala azar; with the exception of one of the patients, whose case was complicated by tuberculosis of the lungs and intestines, there was uniform and rapid improvement.

"The treatment should be continued until the temperature has remained normal for several weeks with steady gain in weight, and the parasites are found to have completely disappeared from the spleen, and the leucocytes have been raised to about the normal level. It is not necessary to continue until the spleen has been reduced to its normal size, as it will continue to shrink after the injections are omitted.

"In children and nervous female patients inunctions of antimony ointment, preferably in a strength of 10 per cent., is worthy of trial, although there is not yet sufficient evidence to decide how far this much simpler measure can be relied on. If further experience shows it to be able to cure the disease it will present manifest advantages, especially in out-patient and village practice.

"We believe that in tartar emetic, and probably in other preparations of antimony, a specific treatment for the terrible lingering and very fatal kala azar has at length been found, and yet another serious tropical disease been brought within the pale of curable affections."

iii. The author was led by the publication in the issue of this *Bulletin* for April, 1915, of a review of an article by G. di CRISTINA and G. CARONIA upon the treatment of infantile kala azar by intravenous injections of tartar emetic to try this treatment in adult cases. After trying the method in nine cases in which the diagnosis was confirmed by spleen puncture he came to the conclusion that it is "undoubtedly a specific for the form of kala azar found in the Hooghly and Burdwan Districts."

All the cases (which are fully described), with the exception of one admitted to hospital in the last stages of the disease, were either cured or showed marked improvement from the commencement of the injections.

The author remarks that he would have preferred to wait before publishing this article until cases had been collected which had stood the test of a year's time without recurrence, but as the results of the injections were so encouraging he considers that this form of treatment should be made widely known at once.

Intramuscular injections of turpentine were given in conjunction with the tartar emetic, as they were found to increase the rate at which the spleen diminishes.

"The turpentine injection consists of a solution of turpentine one part in camphor-creosote one part of each and olive oil two and a half parts. Of this up to ten minims is injected into the muscles of the back on either side of the body.

"I have invariably noted that if such an injection is given to a patient at all advanced in the disease before the tartar emetic treatment is begun there is little or no reaction and swelling.

"If, however, it is given after a week's treatment with tartar emetic, there is a very marked reaction, the part injected swelling and causing considerable pain. Spleen punctures taken at a week's interval show first marked diminution and then complete disappearance of the parasites."

The author's observations lead him to conclude that while the turpentine injections are not absolutely necessary to recovery, it would be delayed without them.

E. J. W.

RAI U. N. BRAHMACHARI BAHADUR. i. **A Preliminary Report on the Treatment of Kala-Azar with Intravenous Injection of Metallic Antimony.**—*Indian Med. Gaz.* 1915. Dec. Vol. 50. No. 12. pp. 455-457. With 1 fig. & 6 charts.

ii. **Further Observations on the Treatment of Kala-Azar and Cases treated with Metallic Antimony, Antimonyl Sodium Tartrate, Formaldehyde and Other Drugs.**—*Ibid.* 1916. Jan. Vol. 51. No. 1. pp. 16-19. With 3 charts.

i. In the first paper the author reports the immediate result of treatment by metallic antimony in five cases which had been diagnosed by the presence of Leishman-Donovan bodies in the spleen. Three or four injections of $\frac{1}{2}$ -1 $\frac{1}{2}$ grains were made in each case at intervals of a few days.

Temperature charts are shown in all cases, and also tables giving changes in the blood, body-weight, and size of spleen ensuing upon treatment. The author says, "So far the results are encouraging and justify further investigation. No untoward results, such as plugging

of the capillaries have followed the intravenous injection of metallic antimony. Sometimes the patient suffered from rather severe diarrhoea, which however stopped in 24 to 48 hours."

The apparatus for injection is illustrated and full details of the technique are given.

ii. In the second paper it is shown that the improvement in the cases had continued up to date, and details of another successful case are given. The author also describes the result of treatment with intravenous injections of galyl, formaldehyde, PLIMMER'S salt (antimonyl sodium tartrate), tartar emetic and antim. sod. tartrate, tartar emetic and other drugs combined (berberine sulphate, nuclein capsules, galyl). His conclusions are as follows :—

"(1) So far as the above cases go to prove, metallic antimony seems to produce very marked beneficial effects in kala azar, and the effects tend to be permanent.

"(2) The soluble salts of antimony, such as tartar emetic and antimonyl sodium tartrate, are also very beneficial in the treatment of the disease.

"(3) Metallic antimony introduced into the circulation remains in the spleen and the liver for a much longer period than when introduced in the form of soluble salts. It may be therefore expected to give rise to more marked and permanent results. Not more than five injections have been given to any of my cases. It appears that not more than three or four injections are required to bring about what appears to me a permanent cure.

"(4) The results obtained from combining antimony treatment with other drugs such as galyl, berberene sulph. and nuclein, do not, so far, seem to differ from what follows the treatment with tartar emetic itself.

"(5) Galyl has been tried in four cases without any effect, but evidently it must be given a further trial before its effect can be determined.

"(6) One remarkable case of recovery has been recorded following intravenous injection of formaldehyde.

"(7) Attempts are being made to prepare a colloidal solution of metallic antimony, and if this succeeds, the colloidal solution of the metal will perhaps be the ideal preparation of antimony to be adopted in the treatment of kala azar."

E. J. W.

RAI HARINATH GHOSH BAHADUR. **The Speedy Recovery of a Case of Kala-Azar by Intravenous Injection of Sodium Antimony Tartrate with Sodium Cinnamate and Berberine Hydrochloride.**—*Calcutta Med. Jl.* 1916. Jan. 6 pp. With 2 charts.

The solution used for injection was as follows :—Sodium Antimony Tartrate, 1 gm.; Sod. Cinnamate, 2 gm.; Berberine Hydrochlor., 1 gm.; Dist. water, 100 cc.

Treatment was commenced with 0.5 cc. (= 0.5 cg.) the dose being gradually increased up to 12.5 cg. when vomiting occurred. Twenty-one injections were given in a period of four weeks.

The patient was in good health two months after cessation of treatment. Parasites had disappeared from the spleen twelve days after the injections were begun.

E. J. W.

JEMMA (R.). **La cura specifica della Leishmaniosi nei bambino.** [The Specific Cure of Leishmaniasis in Children.]—*Pediatrics.* 1916. Jan. Vol. 24. No. 1. pp. 1-5.

A brief report, without any details, of the successful treatment of 26 cases of leishmaniasis in children with solution of tartar

emetic. Of the 26 children 21 were completely cured, while the remaining five died of intercurrent affections. From the post-mortem examination of the tissues of two of the dead children, Professor PIANESE concludes that the drug acts purely as a specific poison of the Leishman body. The action begins with a plasmolysis of the cell-body goes on to a nucleo-lysis, and finally the blepharoplast disappears. This action is first manifested in the endothelial cells of the vessels of the liver, and then in the cells of the bone medulla, and finally in the spleen.

J. B. N.

CARONIA (G.). *L'impiego di nuovi preparati di antimonio per via intramuscolare nella cura della Leishmaniosi infantile.* [The Employment of New Preparations of Antimony in Intramuscular Injections for the Cure of Infantile Leishmaniasis.]—*Pediatrics*. 1916. Feb. Vol. 24. No. 2. pp. 65-81.

An account of the treatment of four cases of leishmaniasis in young children with a new organic compound of antimony termed Acetyl-p-aminophenyl-stibiato of sodium, furnished for trial by the chemical firm of Heyden. The salt in question is easily soluble in distilled water, and contains 38.5 per cent. of antimony. The solution alters with time, and should therefore be freshly prepared for use. It should always be injected intramuscularly, preferably into the gluteal muscles, and never subcutaneously. The dose varies with age. Generally with children under two years of age one should commence with a dose of 3 centigrammes, ending with a maximum of 10 centigrammes, while with children over two years the dose should range from 5 to 15 cgm. Even the dose of 15 cgm. is more than is necessary, and may cause pain and inflammation. The injections should be made at the rate of one every alternate day, and in each buttock alternately. In very thin and ill-nourished children, endovenous injection should be substituted for injection into the buttocks.

Case I. A boy aged three and a half years, ill for six months with irregular fever, wasting and enlargement of the abdomen. Spleen and liver much enlarged. Much anaemia. Splenic puncture showed Leishman bodies. The child got quite well after a three months' course of treatment, the total quantity of the drug injected amounting to 3.60 grammes. No untoward symptoms were produced.

Case II. A girl, aged 23 months, attacked at the age of 17 months with characteristic symptoms of leishmaniasis. Spleen and liver enlarged, while splenic puncture showed Leishman bodies. Rapid cure in 16 days with 9 injections given on alternate days, the dose ranging from 7 to 15 centigrammes of the drug. The number of red cells rose during this period from 1,400,000 to 3,000,000 per cmm., and the haemoglobin from 33 to 60 per cent. of the normal. No Leishman bodies were found by splenic puncture at the conclusion of the treatment. The child was afterwards seen, and showed continued improvement.

Case III. Girl, aged 12 months. Symptoms of five months' duration. Treatment as in the two preceding cases. After the fourth injection of 12.5 cgm. an abscess appeared in the buttock and the dose was reduced to 10 cgm. for the two following doses. Six injections in all were given, in a period of 10 days. The child was seen about a month after leaving the hospital, when the result of a splenic puncture proved negative. Red cells 2,800,000 per cmm. at the beginning of treatment, and 4,570,000 at the end. Haemoglobin 50 and 88 per cent. respectively.

Case IV. Boy, aged 17 months. This child had an abscess in the lumbar regions on its admission to hospital, and eventually died from its extension. It presented, however, concomitant symptoms of Leishmaniasis, and so was submitted to treatment as described. While Leishman bodies were abundant in the spleen at the commencement of the treatment, very few were found at the end. The child received eight injections in all, before death.

The author considers that these four cases demonstrate that the organic compound of antimony mentioned is an efficient specific for infantile leishmaniasis.

J. B. N.

I ASILE (Carlo). **Leishmaniosi interna.** [Leishmaniasis of the Internal Organs.]—*Annali d'Igiene.* 1916. Apr. 30. Vol. 26. No. 4. pp. 248-268. With 6 figs.

A systematic account of internal leishmaniasis, bringing the subject up to date, but not containing anything very novel. At the end of this paper, however, the author mentions an interesting observation by BASILE with regard to infected dogs. Having bought up and killed the greater part of the infected dogs in a certain township (Bordonaro) which was a focus of infantile and canine leishmaniasis, no fresh case of the disease occurred in the following year, and only one in the year afterwards, whereas in the year in which the dogs were killed, there had been as many as seven new cases of infantile leishmaniasis, in a population of 2,000 inhabitants.

J. B. N.

LIGNOS (A.). **La leishmaniose canine à Hydra.**—*Bull. Soc. Path. Exot.* 1916. May. Vol. 9. No. 5. p. 302.

The author examined 48 dogs in the Island of Hydra for presence of leishmania, during the warm season (May-October) 1912. Eight (=16·66 per cent.) were found to be infected.

He examined 78 during the cold season (October-April) 1914-15, and found 7 (=8·97 per cent.) infected.

He concludes that the infection is twice as heavy in the hot as in the cold season.

E. J. W.

PORCELLI-TITONE (F.). **L'azione antiriproduttiva dei raggi ultravioletti studiata sui protozoi (Leishmanie).** [The Anti-Reproductive Action of Ultra-Violet Light on Leishman Bodies.]—*Pediatrics.* 1916. Mar. Vol. 24. No. 3. pp. 147-151.

Leishman bodies from cases of infantile and canine leishmaniasis, from 6 to 10 days' old, were suspended by the author in a mixture of condensation water and salt solution and exposed, in sterile quartz tubes, to the light from a Haeraens mercury-vapour lamp (tension 75 volts), at a distance of 25 centimetres from the lamp. At intervals of so many minutes, specimens were removed for examination in a hanging drop, and also planted out. The authors found, as a result, that an exposure to light, insufficient to kill the organisms outright, will be sufficient to prevent their multiplication.

The tabulated figures are as follows :—

1. Leishman bodies from the child, 10 days' culture. Exposures, up to 10 minutes, to the light affect neither reproduction nor mobility. Exposures from 10 to 20 minutes inhibit reproduction altogether, and diminish mobility slightly. Exposures between 20 and 40 minutes diminish mobility still more, while with more than 40 minutes exposure mobility disappears altogether.

2. With Leishman bodies from the dog, eight days old, the results are the same, except that mobility ceases with exposures over 30 minutes.

In cultures with organisms of which the mobility is only diminished, the bodies will continue to show signs of life, indicated by movement, for from one to seven days, according to the length of exposure, but no further signs of multiplication will appear.

J. B. N.

SUTHERLAND (W. D.) & MITRA (G. C.). **The Wassermann Reaction in Malaria, Kala-Azar and Leprosy.**—*Indian Jl. Med. Res.* 1915. Apr. Vol. 2. No. 4. pp. 984-989.

The part of this paper which deals with kala azar is as follows :—

"We were able to examine the blood of 38 cases of kala azar. In all of these the parasite had been found, by careful and competent observers, in smears taken from splenic material obtained by puncture. Of the 38 cases 10 gave a positive and 28 a negative reaction. Of the 10 positive cases only two gave a more than slightly positive reaction. As to the work of other observers of this disease we can unfortunately say nothing, for up to July 1914 the literature is silent on this point."

E. J. W.

MAGGIORE (Salvatore). **Contributo allo studio della patogenesi dell'anemia nella Leishmaniosi interna.** [A Contribution to the Study of the Origin of the Anaemia in Internal Leishmaniasis].—*Malaria e Malt d. Paesi Caldi.* 1916. Jan. Vol. 7. No. 1. pp. 18-20.

A short research directed to ascertaining the presence of haemolysins in the blood of cases of leishmaniasis. The result was negative in the six children examined. The serum was incubated for an hour in the thermostat at 37° in different proportions, with a 5 per cent. suspension of washed red corpuscles in physiological salt solution, and also with unwashed blood taken directly from the vein in order to eliminate the possible influence of the salt solution. The conclusion is that the anaemia of leishmaniasis is due to alterations in the tissue of the bone medulla.

J. B. N.

LAVERAN (A.). **Infections expérimentales de la souris par la *Leishmania tropica*; un cas d'infection par la voie digestive.**—*C. R. Acad. Sci.* 1916. Jan. 31. Vol. 162. pp. 187-190.

The author commences by summarising his work upon the experimental infection of mice with *L. tropica* by the intraperitoneal route [this *Bulletin*, Vol. 4, p. 401, Vol. 5, p. 277, Vol. 6, p. 230].

Up to the present time he has passed the infection successively through five mice. Of 36 mice inoculated intraperitoneally or subcutaneously 21 developed cutaneous or subcutaneous lesions without general infection; nine developed cutaneous or subcutaneous lesions with general infection (for the most part mild); none developed general infection without cutaneous or subcutaneous lesions; six remained uninfected.

Of 47 mice inoculated with the virus of Indian or Mediterranean kala azar none developed skin lesions.

The greater part of the paper is occupied with the description of a case of successful infection of a mouse with *L. tropica* by the alimentary tract. A male white mouse, kept isolated in a jar and free from fleas, was fed upon cultures of *L. tropica* on the following dates:—5, 9, 14, 19, 25 May, 1, 6, 23 June, 1915. Four or five drops of a culture were instilled on each occasion into the mouth by means of a pipette, minute precautions being taken against injury to the mucosa. On the 24th January the left hind foot was seen to be swollen, chiefly at the level of the tarso-metatarsal articulation. The skin was red and finely injected and light pressure produced movements indicative of pain. The animal dragged the foot after it.

The subcutaneous tissue at the level of the affected articulation was punctured and smears were made. These showed numerous leishmania. On the 31st January the swelling had increased, but there were no other lesions and there was no testicular swelling.

Of three other mice which were similarly fed, one which died five months after the first ingestion showed no trace of infection. The two others, which are still alive, do not appear to be infected.

The author remarks that this is the first example of infection of an animal with *L. tropica* by ingestion of culture, and that two cases of such infection of monkeys by *L. donovani* are known.

E. J. W.

LAVERAN (A.). *Leishmaniose cutanée expérimentale chez les macaques et chez le chien. Conditions de l'immunité.*—*Bull. Soc. Path. Exot.* 1916. Apr. Vol. 9. No. 4. pp. 265–275. With 1 plate.

The following method of inoculation has been adopted by the author as it has the advantage of being perfectly reliable and of being associated with a short incubation period.

The site of election is the outer surface of the thigh. The skin is here less vascular than on the head and there is therefore little bleeding while, even in small animals, there is plenty of adjacent space left for reinoculation. [In the experiments described dogs were sometimes inoculated at the base of the ears.] The skin is shaved and washed with peroxide of hydrogen. Three punctures are made obliquely through the entire thickness of the skin at a distance from one another of at least 1 cm. When the bleeding, if any, has ceased, a particle of tissue from a mouse infected with *L. tropica* is introduced to the bottom of each puncture.

In two *Macacus rhesus* thus inoculated the incubation period was ten and eight days, typical lesions being produced. In one of the animals the duration of the lesions was 80 days, in the other 60 days. Both showed leishmania in great numbers. The parasites diminished

rapidly as soon as ulceration commenced, a phenomenon which agrees with the well-known fact that they do not readily survive in the presence of bacteria. It is probable that microbic invasion plays a part in the healing of Oriental sore.

Having established a reliable method of inoculation, the author proceeded to investigate the question of immunity.

The experiments were conducted with dogs, as during the last two years it has been difficult to obtain monkeys. The material used was obtained from infected mice. The first two dogs were inoculated successfully at the first attempt. The lesions persisted for three months and for 79 days respectively. They were successfully reinoculated after the lesions had been healed approximately one month. The lesions persisted for 46 and 56 days respectively. These two experiments show that the second attack was less severe than the first.

In the third and fourth experiments now to be described the first inoculation was negative after an interval of one month. The inoculation was then repeated at another site with a positive result both at the new and at the original sites.

In the third experiment a result similar to the two above described was produced, the first and second infections lasting 89 and 37 days. But now a third inoculation was made 21 days after the lesion produced by the second inoculation had healed. There was a slight local reaction which subsided so rapidly that no search could be made for parasites. The conclusion arrived at was that, at the time, immunity was established.

In the fourth experiment six inoculations were made. The first infection lasted 95 days. The second inoculation, made more than two months after the lesions had healed was successful. The lesions persisted for 38 days. A third and fourth inoculation were then made, respectively 5 and 63 days after the lesions produced by the second inoculation had healed. After the third, there was a slight local reaction but no parasites were found on puncture. The result of the fourth inoculation was entirely negative. A fifth inoculation, however, made 109 days after the lesions of the second inoculation had healed gave a positive result. The parasites were scanty in number. The lesions persisted for 48 days. A sixth inoculation made one month after the lesions produced by the fifth inoculation had healed also gave a positive result, with leishmania in fair numbers. The lesions persisted for 43 days. The author remarks that while it may be said that the recurrences were due to the powerful doses employed, the use of feeble doses is fraught with the risk that a negative result may be produced even in susceptible animals, and he further points out that second attacks following natural infection of Oriental sore in man are not uncommon.

He draws the following conclusions from his experiments :—

1. Using material from mice infected with *L. tropica*, lesions containing large numbers of parasites can be produced with certainty in *Macacus rhesus* and dogs.

2. Immunity is sometimes established after successful inoculation. In dogs, a second attack is usually produced by reinoculation practised after the first lesions have healed. The lesions, though characteristic, are smaller and less persistent than in the first attack.

3. After the second attack, immunity is usually established and inoculation produces only abortive lesions. But even after one or two negative inoculations, characteristic lesions may be obtained when some months have elapsed since the healing of the results of the second inoculation.

E. J. W.

TOWNSEND (Charles H. T.). **The Insect Vector of Uta, a Peruvian Disease.**—*Jl. Parasit.* 1915. Dec. Vol. 2. No. 2. pp. 67-73. With 4 figs.

The first part of this paper is taken up with the discussion of the probable relation of uta to other diseases of a similar character occurring in South America.

The author, writing from the Bureau of Entomology, Washington, considers that the uta of the western face of the Andes is distinct from the *espendia* of the eastern slopes, and from the *bouba* or oral leishmaniasis of southern Brazil and northern Paraguay, and that in the absence of tubercular complication it is not a more serious affection than oriental sore to which it is very closely allied.

Dr. A. L. BARTON of Lima is stated to have been the first to arrive at a correct diagnosis of uta as dermal leishmaniasis. He believed the organism seen by him to be identical with that of oriental sore and did not therefore publish the notes he made in 1910 recording his observations, and which he showed to the author. Since that time the author has seen leishmania in smears from uta lesions made by various Peruvian investigators so that the nature of the affection has now been, in his opinion, abundantly demonstrated.

The second part of the paper consists of a description of the author's investigations with specimens of *Forcipomyia*. The ground up products of 27 *Forcipomyia utae* were injected into the ventral region of a guinea-pig. In smears made from the resulting sore, leishmania were found, and also in smears made from the ground-up bodies of four gnats of the same species and from the same lot as were used for the injection. Longitudinal sections were also made of *Forcipomyia townsendi*. These showed numerous leishmania in the abdominal region, apparently only in the gut and none were to be seen in the thoracic region or head. Figures of the Leishman bodies seen in the smears and sections are shown.

The author is of opinion that the organism is voided by the insects from the anus while feeding, that infection occurs when the bites are rubbed, and that as it exists in no form that can reach the salivary glands or proboscis there is no other possible method by which it can be transmitted by biting insects.

The geographical range and seasonal prevalence of uta correspond with the distribution and season of greatest prevalence of the fly.

Two cases, diagnosed as uta, are cited, in one of which, according to the author, the infection was certainly and in the other, probably, traceable to the bites of *Forcipomyia*. Unfortunately the lesions were in neither case microscopically examined. The paper concludes with the following paragraph and summary:—

"In conclusion, attention should be called to one important point. As late as 1915, investigators of leishmaniasis have questioned whether the specific organism is not really a stage in the development of a *Crithidia*

or *Herpetomonas* normally confined to the gut of insects, normally conveyed from insect to insect, and only accidentally transferred to man. In the present case the fact that most species of *Forcipomyia* are normally insect-biters, attacking caterpillars and certain other insects, would tend to confirm this view. *Forcipomyia uta* and *townsendi* are very abundant at times during the humid season. It may easily transpire that these gnats, while normally confining their attacks to other insects, have become accustomed, during their periods of greatest abundance, to transfer their attacks to man, due to a shortage of food-supply in the insect fauna requisite for the needs of their increased numbers.

SUMMARY.

"(1) The disease known as *uta*, occurring on the west face of the Andes in Peru, has been proved to be due to a *Leishmania*.

"(2) Two species of *Forcipomyia*, native to the western Andean region, appear to be proved capable of transmitting the *Leishmania* of *uta*.

"(3) It is highly probable that the various forms of leishmaniasis thus far known are due to as many species of herpetomonads originally parasitic in the gut of the insect-carriers concerned, and that, with regard to the occurrence in man, these herpetomonads are as yet in the stages of parasitism ranging from habitually abnormal or frequent to merely accidental or infrequent."

E. J. W.

ESCOMEL (E.). Contribution à l'étude de la Leishmaniose américaine (Laveran et Nattan-Larrier). Formes et variétés cliniques.—*Bull. Soc. Path. Exot.* 1916. Apr. Vol. 9. No. 4. pp. 215-219.

American leishmaniasis is clinically classified as follows :—

- | | | |
|---------------------|----|---|
| I. Skin | .. | (a) Ulcerating. |
| | | (b) Non-ulcerating or papulo-tuberculous. |
| | | (c) Atrophic. |
| | | (d) Lymphangitic. |
| | | (e) Circinate. |
| II. Mucous Membrane | { | (a) Continuous with skin lesion (resembling Oriental sore). |
| | | (b) Not continuous with skin lesion (resembling Blastomycosis). |

These clinical varieties are described in detail and only an outline of the descriptions can be given here :—

I. (a) This is defined as the ordinary variety described by all writers.

(b) The condition begins as a small wart which slowly increases in size without ulceration and persists for some time. The skin over it may be thickened or wrinkled. There may be several such warts becoming confluent and giving rise to a papillomatous appearance.

(c) Occurring especially at the level of the waist and on the thighs and buttocks. Characterised by numerous plaques of a deep red colour, round or oval in shape, surface depressed with a well defined margin. They may or may not ulcerate.

(d) Occurs especially on the legs, in the form of numerous ulcers situated along the course of the lymphatics, the earliest one being near the ankle.

(e) Occurs generally as a single large ulcer with an irregular margin. The author remarks that it is especially in this variety of ulceration that flagellate forms of leishmania are found.

II. (a) The leishmaniasis of the mucous membranes nearly always begins in the skin. The initial lesion in this variety is on the nose or lips and gradually reaches the mucosa. It does not produce the degree of tissue destruction of the following variety.

(b) The primary skin lesion is at a distance: on the fore-arm, the leg or the neck, and it is usually some considerable time later that the lesions of the mucosa make their appearance. These commence in the nasal mucous membrane and may progress for many years attacking the palate, pharynx, etc., without, however, necessarily endangering life. The condition may readily be confused with blastomycosis but leishmaniasis is distinguished by the result of microscopic examination and by the fact that it does not spread under the epithelium, whereas the yellowish spots of blastomycosis can be seen under the buccal mucous membrane.

E. J. W.

RABELLO (Ed.). **La Leishmaniose tégumentaire au Brésil.**—*Bull. Soc. Française de Dermal. et de Syph.* 1914-15. July-Dec. Vol. 25. No. 7. pp. 375-379.

This is a short paper based on the author's experience of the disease in Rio, and is for the most part a recapitulation of the existing knowledge of the subject. The following are points of interest:—

1. A rather common form of the disease is one in which an ulcer of the skin becomes the site of papillomatous plaques, hard and horny.

2. When the naso-oro-pharyngeal mucosa becomes affected, the trouble begins on the nasal mucous membrane of the right side as a small, raised, granular ulcer which may pass unnoticed for some time.

3. Navvies and railway workmen are especially subject to the disease.

4. From an etiological point of view, age and sex appear to have influence.

5. The Wassermann test may be positive in cases where syphilis can be excluded.

6. As regards treatment, applications of tincture of iodine, permanganate of potash, or argyrol are recommended for the skin lesions. Salvarsan in some cases improved the skin condition, but had no effect on lesions of the mucosa.

The author bears out the testimony of other workers as to the beneficial effect of intravenous injections of tartar emetic. The treatment is more quickly effective on lesions of the skin than on those of the mucosa and where the latter exist may have to be persisted with for several months.!

E. J. W.

TORRES (Octavio). **Observação de um caso de leishmaniose cutanea.** [Notes of a Case of Cutaneous Leishmaniasis.]—*Brazil Med.* 1916. Feb. 19. Vol. 30. No. 8. pp. 57-60. With 4 figs.

Notes of a case of cutaneous leishmaniasis, successfully treated with tartar emetic, in a Syrian immigrant. Sixteen injections of tartar emetic, gradually increased from 4 to 10 centigrammes per dose

sufficed to bring about a cure. The illustration show the distribution of the ulcers over the patient's body. The history of the case was difficult to obtain, on account of the patient's inability to speak Portuguese freely.

J. B. N.

BORJA (Antonio) & AMARAL (Afranio). **Contribuição ao tratamento da Leishmaniose cutaneo-mucosa pelas injeções endo-phlebicas de emetico.** [A Contribution to the Treatment of Muco-Cutaneous Leishmaniasis by Intravenous Injections of Tartar Emetic.]—*Arch. Brasileiros de Med.* 1915. Feb.-Mar. Vol. 5. No. 2-3. pp. 145-154. With 3 plates.

Notes of seven cases of leishmaniasis of the face treated on VIANNA's plan with injections of tartar emetic, with the exception that a 4 per cent. strength in physiological salt solution was employed instead of the one per cent. recommended by VIANNA. The dose of tartar emetic remains the same, but the reduction in the bulk of menstruum is found to obviate rises of temperature. Comparative tables of temperature are given to demonstrate this point.

J. B. N.

PROTOZOOLOGY.

BALFOUR (Andrew). On the Occurrence of *Herpetomonads* (?) in Gerbils.—*Parasitology*. 1916. Jan. Vol. 8. No. 3. pp. 260-261.

The author refers to the paper by FANTHAM and PORTER [see this Bulletin, Vol. 6, p. 183]. In 1904 or 1905 when working at trypanosomiasis in Khartoum, he observed a flagellate in the fresh peripheral blood of a gerbil (*Gerbillus pygargus*) which was clearly not a trypanosome, but unfortunately the preparation was destroyed. The movements of the flagellate "were exceedingly rapid and jerky," and the posterior end was curved or flexed a little so that it appeared hook-like. Although many more animals were examined, the parasite was not seen again till Capt. ARCHIBALD several years later observed a single example in the fresh blood of a gerbil, but the parasite could not be found when the preparation was fixed and stained. The author does not think that the parasite was due to accidental contamination. The flea most commonly found both on the gerbils and the jerboas in the Sudan is *Pulex cleopatrae*, in which the author found herpetomonads in 1906.

H. B. Fantham.

SANGIORGI (G.) & UGDULENA (G.). Reperto di un flagellato (*Prowazekia italica*, n. sp.) nell' intestino umano.—*Pathologica*. 1916. Apr. 15. Vol 8. No. 179. pp. 115-118.

The organism, *Prowazekia italica*, was found in a peptone-water culture of the faeces of a convalescent soldier in the chief military hospital in Venice. The flagellates could be subcultured on peptone water, on faeces, and on other media such as agar kept at a temperature of 22° C. to 24° C. Oval elements from peptone-water cultures usually measured 11.6 μ by 8.3 μ , but some were a little larger and others somewhat smaller. Teratological specimens of small breadth were sometimes seen. Vacuoles and food granules were present in some specimens. Two flagella occurred in each parasite and, as in Bodo, they arose anteriorly from two basal granules (diplosome). The kinetonucleus was large. Discoidal and pyriform organisms were also observed. A karyosome was seen very occasionally and with some difficulty in the kinetonucleus.

Multiplication was by longitudinal fission. Small daughter forms about 3 μ in diameter have been seen. It is uncertain whether encystment occurs.

The organism is placed in the genus *Prowazekia*, and the specific name *italica* is assigned to it [but it is doubtful whether the organism is distinct from other species of *Prowazekia* described from cultures of human faeces.]

H. B. F.

ARAGÃO (Henrique de Beaurepaire). *Copromastix prowazeki*, n. g., n. sp. (Nota prévia).—*Brazil Med.* 1916. Feb. 12. Vol. 30. No. 7. p. 49. With 1 text-fig.

The author describes a flagellate found in cultures of human and frog faeces at Manguinhos, Brazil. The body of the organism is

roughly triangular, measuring 15μ long by 8μ broad. There is a nucleus near the anterior end and there is a cytostome at a corner near by. A rhizostyle is present, and four equal flagella arise from a basal corpuscle thereon. The flagellate executed slow and graceful movements, turning on its long axis.

The diagnosis of the new genus *Copromastix* is as follows:—A Tetramitid, with four anterior equal flagella, a subtriangular body, and a cytostome containing no organella. Neither undulating membrane nor axostyle is present.

The type species, *C. prowazeki*, is named after Dr. S. von PROWAZEK. There is one text-figure.

H. B. F.

KOFOID (Charles Atwood) & SWEZY (Olive). **Mitosis and Multiple Fission in Trichomonad Flagellates.**—*Proc. Amer. Acad. Arts & Sci.* 1915. Nov. Vol. 51. No. 6. pp. 289-378. With 8 plates and 7 text-figs.

This long and well illustrated memoir is fully summarised in the authors' own words, thus:—

"1. The upper part of the large intestine of most vertebrates is infected by trichomonad flagellates whose phases of mitosis and multiple fission occur at intervals and are met with in a few of the many hosts examined. These processes are carried out during periods of great amoeboid activity of these parasites in the mucus of the intestinal epithelium.

"2. Mitosis is promitotic with nuclear membrane intact throughout the period of division, with nuclear separation by constriction simulating amitosis. It is, however, essentially mitotic with extranuclear division centres, intranuclear spindle fibres, chromosome organization out of a chromatin network and skein.

"3. The chromosomes are definite in number, four in *Tetratrichomonas prowazeki*, and five in *Trichomonas augusta*, *T. muris*, and *Eutrichomastix serpentis*. They are differentiated in form, there being one small one, and some fairly constant size differences among the larger ones. They are differentiated in behaviour, the small one (in *T. muris*) having a particular location in the nucleus in the late prophase, and lagging on the spindle in the metaphase.

"4. The chromosomes appear to split longitudinally prior to their arrangement in the equatorial plate, and seem to slip into an end-to-end position in this plate, or to be parted by a transverse constriction.

"5. The extranuclear organelles all share in the process of mitosis. The blepharoplast from which flagella, rhizoplast, chromatic margin and basal rod, and axostyle all take their origin, contains the division centre. It parts into two bodies which go to the two poles of the fusiform mitotic nucleus spinning out the deeply staining always extranuclear parademesome between them.

"6. The daughter blepharoplasts may each divide in the polar position into an axial centrosome and an adjacent basal granule to which flagella, parademesome, and parabasal are attached. These two granules subsequently reunite.

"7. In its divisions the blepharoplast shows no independent mitotic phenomena. It is not a 'kinetonucleus,' and its behaviour does not support the binuclearity hypothesis.

"8. The anterior flagella are shared, two and one respectively by the daughter blepharoplasts, and new outgrowths complete the complement of each daughter organism.

"9. The chromatic margin of the undulating membrane represents an intracytoplasmic posteriorly directed flagellum. It splits longitudinally to the tip of its projecting end. The undulating membrane below it also splits.

"10. The chromatic basal rod is the homologue of the parabasal body of *Parajoenia* and the Trichonymphida as established by Janicki. His so-called parabasal in *Trichomonas* is in reality only the early stage in the outgrowth of a new parabasal or chromatic basal rod at mitosis, hence its rarity and transitory nature. At mitosis a new parabasal or chromatic basal rod grows out in the base of one of the new undulating membranes while the old parabasal lies in the other membrane.

"11. The new axostyles of the daughter organisms are formed by the longitudinal splitting of the old axostyle from the anterior end posteriorly. They are not formed from the paradesmose (central spindle) as maintained by Dobell nor anew as claimed by Kuczynski.

"12. The axostyle is not primarily a skeletal structure as usually supposed, nor an organ of fixation as described by Kunstler and Kuczynski but a locomotor organ used vigorously during the amoeboid stage in the mucous substrate.

"13. During mitosis the organelles are subject to a wide variation in location due to independent shifting of axostyle and nucleus, and to a less extent to the detachment of the blepharoplast from its usual relation to the nucleus.

"14. Plasmotomy is long delayed after nuclear mitosis and during this period many widely varying positions of the two daughter nuclei and their attached extranuclear organelles are rapidly assumed. Some of these may simulate copulation.

"15. The plane of division is longitudinal. Its determination should be based on the fundamental morphological relations of the organelle and not, as by Martin and Robertson, on the chance relations of these structures in the amoeboid postmitotic period.

"16. Multiple fission occurs in the trichomonad flagellates as a normal phase of the life-cycle and results in the formation of an 8 nucleate plasmodium or somatella. We have not been able, as yet, to relate it to a particular stage such as gametogenesis, or to the divisions of a zygote. Three rapidly succeeding synchronous mitoses give rise to 2-4-8-nucleate plasmodia which are not encysted and remain very active throughout the process. The plasmodium disintegrates into its component members by the successive detachment of single merozoites.

"17. The widespread and regular occurrence of the stage of a multi-nucleate plasmodium among these simple protozoa is significant as an early step in the evolution of the more permanent multinucleate and multicellular aggregates which constitute the Metazoa."

H. B. F.

KOFOID (Charles Atwood) & CHRISTIANSEN (Elizabeth B.). **On the Life-History of Giardia.**—*Proc. Nat. Acad. Sci.* 1915. Nov. Vol. 1. No. 11. pp. 547-552. With 1 text-fig.

During the authors' investigations at Berkeley, California, 220 mammals were examined, consisting of various rats, mice and coyotes. About 13 per cent. of the animals were infected with species of *Giardia*, especially *G. muris* and *G. microti* sp. nov. These flagellates, commonly known as *Lambli*a, produce a chronic enteritis in young mice.

The authors' results, which are apparently preliminary, are best summarised in their own words, as given in their last paragraph:—

"Our work has shown that *Giardia muris* and *G. microti* produce a readily recognizable enteritis in mice, and that both binary and multiple fission take place in the free non-encysted stage. It may be found abundantly in material well smeared out from the intestinal epithelium. Multiple fission results in a 16-nucleate, 8-zooid plasmodium which later undergoes disintegrative plasmotomy. There is no *Ocetomitus* stage in the life-history of *Giardia*. There is typically one axostyle in the trophozoite. Prophase stages in which this has divided to form two axostyles are often seen. The so-called 'Rätzelkörper' are homologues of the parabasals of the trichomonads. The extranuclear organelles are united with the

karyosome, centrosome, and blepharoplast in an integrated neuromotor apparatus. Mitosis is intranuclear, with precocious splitting of the four chromosomes which subsequently fuse in four in the equatorial plate. Free pairs of individuals are found united in back-to-back position as in the so-called conjugation cysts. Nuclei in these cysts undergo two divisions simulating reduction divisions in which, however, chromosomes reduction has not been demonstrated. No evidence in support of autogamy and no proof of sexual reproduction has been discovered.

"Morphological characters separate six species in *Giardia*. The parasite in mice appears to be distinct from that in man. The generic name *Giardia* Kunstler should supersede *Lambli*a Blanchard on grounds of priority."

H. B. F.

SANGIORGI (Guiseppe). **Di un coccidio parassita del rene della cavia.**

—*Pathologica*. 1916. Feb. 15. Vol. 8. No. 175. pp. 49-53.

The author has found in the kidneys of experimental guinea-pigs a coccidian parasite which he considers specific to the host. The parasites were found in the renal epithelium, both intracellular and free, the cells of the convoluted tubules containing intracellular forms, while extracellular parasites were found in the loop of Henle and the straight tubules. Rounded forms, which were mostly intracellular, varied in diameter from 6.4μ to 19.2μ . Oval and irregularly rounded forms were also intracellular and were variable in size, such as 8μ by 4.8μ up to 19.2μ by 16.6μ . Extracellular forms were of two types, usually oval, and measured 12.8μ by 8μ and 16μ by 9.6μ respectively. Vacuolation occurred in intracellular forms. Young schizonts were small, spherical and about 6.4μ in diameter. They increased in size and 18 to 24 merozoites were formed within them. These daughter forms were small, averaging 4.8μ by 1.6μ . Probable gametocytes of both sexes were also observed, and the author thinks that the microgametocytes give rise to four oval microgametes. A parasite which he believed to have been a macrogamete measured 19μ in diameter. Zygotes measured 12.8μ by 8μ and were encapsuled. Many spherical sporozoites, of a diameter of about 3.6μ , were formed within the zygote.

Schizogony occurred in the epithelium of the convoluted tubules, and sporogony in the lumen of the straight tubules and loop of Henle.

It was shown experimentally that the urine of an infected guinea-pig, which contained cysts of the coccidian parasite, when mixed with food and ingested by a healthy guinea-pig, reproduced renal infection in the new host.

The author briefly considers the systematic position of the parasite which he places in the genus *Klossia* and, considering it specific to the guinea-pig, calls it *Klossia caviae*.

[SEIDELIN (Dec. 1914) has previously described this parasite under the more correct generic name, *Klossiella*, and suggested the specific name, *K. cobayae*. (See this *Bulletin*, Vol. 5, p. 284).]

H. B. F.

PETIT (Auguste). **Sur un Sporozoaire parasite du Cobaye, appartenant au genre *Klossiella* Smith et Johnson.**—*C. R. Soc. Biol.* 1916.

Feb. 19. Vol. 79. No. 4. pp. 168-170.

The author has observed a *Klossiella* in one kidney of a guinea-pig bred in the Institut Pasteur at Garches. The infection was rare and

the full life-cycle of the parasite could not be observed. At first the organism is rounded and small, about 7μ in diameter. The cytoplasm of the host cell hypertrophies and finally forms a sheath to the sporozoön. Mitoses occur at the periphery of the parasite and growth continues until the organism is about 30μ in diameter. A number of ovoid corpuscles about 10μ are ultimately produced, each consisting of a thin refringent cuticle surrounding a granular cytoplasm containing nuclei in karyokinesis. These various forms only were observed. The organism is identified with *Klossiella cobayae* Seidelin 1914 [see this *Bulletin*, Vol. 5, p. 284]. The parasite, however, was first observed by PIANESE and described by him in 1901 in an important memoir which has been largely overlooked.

H. B. F.

PEARCE (Louise). *Klossiella* Infection of the Guinea-pig.—*Jl. Experim. Med.* 1916. Apr. Vol 23. No. 4. pp. 431-442. With 8 plates.

The material consisted of sections of the kidneys of 60 adult guinea-pigs from Philadelphia and New Brunswick, N.J. Twelve guinea-pigs were found to be infected with a renal parasite which closely resembled *Klossiella muris*. Mention is made of the previous work of SMITH and JOHNSON and of SEIDELIN [see this *Bulletin*, Vol. 5, p. 284].

The sporoblast cycle is stated to be most frequently a small round or ovoid body measuring 7μ to 8μ in diameter, and occurring in the lumen of the kidney tubules, usually in the straight tubules of the inner half of the cortex, sometimes in the convoluted tubules. The sporoblast divides into eight to twelve small falciform bodies, 1μ by 4 to 5μ , which are the sporozoites.

Ring forms, 18μ to 20μ in diameter, occur within epithelial cells, which become enlarged. This annular form contains 12 to 18 segments arranged in a circle, each measuring 3μ by 5μ to 7μ . Small ovoid hyaline forms, 5μ to 8μ long by 3μ to 5μ broad, were also seen, and may be either extra- or intra-cellular.

Spherical schizonts, 22μ in diameter, contain 30 to 40 tiny fusiform merozoites, which are extracellular, occurring in the lumen of the convoluted tubules. The merozoites are similar to the sporozoites, but are not common.

The parasite produces lesions. These "consist in an irregular accumulation of fibroblasts and small round cells about the base of some of the glomeruli."

The relationship of the various stages of the parasite found is discussed. A possible ring-shaped microgametocyte was seen.

The plates contain 21 figures, mostly microphotographs.

The author's summary is :—

"We have found in the kidneys of twelve supposedly normal guinea-pigs, coming from Pennsylvania and New Jersey, a parasite that closely resembles in some of its phases *Klossiella muris*, described by Smith and Johnson, and the renal parasite of two West African guinea-pigs, described by Seidelin.

"The forms most commonly found by us and described as the sporoblast cycle, are evidently similar to those described by Smith and Johnson and by Seidelin. There are certain discrepancies of measurement between the parasite described by Seidelin and the one here described, but the most important difference between the two is the different number of sporozoites resulting from a final division of the daughter sporoblasts. Seidelin has

found thirty sporozoites; we have found from eight to twelve, while the usual number is eight. Further, we have found a ring form which is unlike any of the stages in either the sporoblast or schizogonic cycle, and which we interpret tentatively as the male element or microgamete. In addition, we have found a tubular form which resembles the glomerular body of *Klossiella muris* and which we think is the schizogonic phase of this parasite."

H. B. F.

CRAWLEY (Howard). **Note on the Stage of *Piroplasma bigeminum* which occurs in the Cattle Tick *Margaropus annulatus*.—*Jl. Parasit.* 1915. Dec. Vol. 2. No. 2. pp. 87-92. With 4 figs.**

The stage of *Piroplasma bigeminum* found is gregarinoid and was observed in engorged female ticks removed from cattle in Bethesda, Md., in September 1913. The gregarinoids—which are indicated in four text-figures—correspond to the club-shaped bodies described by CHRISTOPHERS (1907) in dog ticks transmitting *P. canis*. References to the literature on this subject and to cultural forms are given. The author's summary, which clearly indicates his results, is as follows:—

"A parasitic protozoan was found in smears made from female cattle ticks (*Margaropus annulatus*), and from crushed eggs which they had deposited. The parasite has the form of a minute polycystid gregarine, and is believed to represent the stage of *Piroplasma bigeminum* occurring in the tick. It is essentially like the form figured and described by Koch as present in engorged female ticks and their eggs, and also like the form of *Piroplasma canis* found by Christophers in *Rhipicephalus sanguineus*. In the present case, it is of interest to note that the female ticks in which the parasites were found showed an unusual mortality, suggesting that the parasite is pathogenic for the tick as well as for the cow. In addition to the gregarinoid parasite a spirochaete was found in the ticks. This parasite not heretofore reported from the United States is perhaps the same as the form known as *Spirochaeta theileri*."

H. B. F.

YAKIMOFF (W. L.). **A propos de la note de M. Rodhain sur *Theileria ovis*.—*Bull. Soc. Path. Exot.* 1916. Apr. Vol. 9. No. 4. p. 201.**

The author points out that, prior to the discovery by RODHAIN in 1916 of an endocorpuseular parasite considered identical with *Theileria mutans* in the blood of Ovidae [see below, page 25], he had described the same organism in 1913, and had named it *Theileria ovis*. *Piroplasma ovis* and *Theileria ovis* were found in April and May, 1913, in Ovidae in Russian Turkestan.

H. B. F.

SCHUBERG (A.) & RODRIGUEZ (Carlos). ***Thelohania corethrae*, n. sp., eine neue Mikrosporidienart aus Corethra Larven.—*Arb. d. d. Kaiserl. Gesundh.* 1915. Sept. Vol. 50. No. 1. pp. 122-132. With 2 plates.**

The authors have examined larvae of *Corethra* (*Savomyia*) *plumicornis*, found in the pools and experimental ponds in the grounds of the Imperial Institute at Dahlem. Towards the end of 1911 transparent larvae with spherical inclusions were seen. These inclusions proved to be masses of Microsporidia, and provided the material on which the present results are based. Gilson's fluid was used as a fixative and smears and sections were examined. The parasites were most abundant

in the thorax, under the air-sacs and in the sixth to eighth segments of the larvae. They also occurred in the head above the faceted eyes. They were not present in the musculature or fat body. The intracellular forms of the parasite were contained in oenocytes, the youngest stages being small spheres usually with two nuclei. They grow into large oval forms with a nucleus at each pole. Each organism undergoes nuclear division until eight nuclei are produced. The protoplasm segregates into eight bodies, each nucleus divides into two and a rosette of eight binucleate daughter forms is produced. Multiplication is accompanied by growth, each of the eight daughter forms becoming as large as the parent. Sporogony ensues, the spores being produced from an eight-nucleate parent form. Each spore is uninucleate and has a girdle-like mass of sporoplasm and a polar filament, while some chromidial granules may be present.

The parasite is placed in the Oligosporogenea, a sub-division of the Microsporidia. It is considered to be a new species of the genus *Thelohania* and is named *Thelohania corethrae*. H. B. F.

GALLI-VALERIO (B.). **Are Sarcosporidia Aberrant Forms of Cnidosporidia of Invertebrates?**—*Jl. Parasit.* 1916. Mar. Vol. 2. No. 3. pp. 126-128.

The author states that in 1896 PIANA obtained motile amoebic bodies from cultures of *Sarcocystis tenella*, and that he, himself, in 1913 obtained similar bodies from cultures of *S. muris*. ERDMANN (1914) found amoebulae in the intestinal cells of mice experimentally infected with Sarcosporidia by the mouth [see this *Bulletin*, Vol. 4, p. 391].

Reference is also made to infections with Myxosporidia and to DARLING's suggestion that Sarcosporidia may be "side-tracked varieties of some of the Neosporidia of invertebrates" [see this *Bulletin*, Vol. 6, p. 201].

The author's summary is:—

"1. The observations of Piana and Galli-Valerio to the effect that spores of Sarcosporidia produce amoebic bodies in cultures, more closely relate the Sarcosporidia to the Cnidosporidia.

"2. If true that Sarcosporidia are only aberrant forms of Neosporidia of invertebrates, then the hypothesis of Darling becomes more probable."

H. B. F.

WATSON (Minnie E.). **A New Infusorian Parasite in Sand Fleas.**—*Jl. Parasit.* 1916. Mar. Vol. 2. No. 3. pp. 145-146. With 5 text-figs.

Two sand fleas out of 300 examined at Long Island Sound, N.Y., were found to be infected with a new species of Balantidium. The sand fleas were *Orchestia agilis* and *Talorchestia longicornis*; they were infected in their alimentary tracts.

The trophic forms of the Balantidia, which were numerous, measured 300μ to 360μ by 180μ to 220μ . The body was ovoidal or ellipsoidal, the macronucleus ellipsoidal, and the micronucleus was small and contiguous to the larger nucleus. There was a small and inconspicuous apical or subapical oval groove, leading into a short slender oesophagus, also a contractile vacuole at the opposite end. Transverse fission was observed and conjugation was seen in one instance.

The parasite is named *Balantidium orchestium*.

H. B. F.

PORTER (Annie). **The Occurrence of *Pneumocystis carinii* in Mice in England.**—*Parasitology*. 1916. Vol. 8. No. 3. pp. 255–259. With 8 text-figs.

The author summarises the history of small pulmonary cysts in mammals and mentions their confusion with stages of the life-cycle of certain trypanosomes. Pneumocysts have been found in rabbits, dogs, cats, lambs, goats, rats, and possibly man. The parasite is now described from a healthy wild mouse accidentally killed in Cambridge. The lung cysts were spherical or oval bodies 4μ to 5μ in diameter when young, and 5μ to 6.5μ when mature. At first they were uninucleate, but older cysts showed two, four or eight nuclei. Eight vermiform merozoites were produced, each with a single nucleus, and measuring 1.5μ to 2.5μ by 0.5μ . These stages are illustrated by text figures. The probable mode of transmission is contaminative, such as by means of the oral or nasal secretions. The mouse was not parasitised by trypanosomes, leucocytothegares or coccidia.

The author's conclusions are :—

“*Pneumocystis carinii* has been found in the lungs of a mouse in England. The cysts are spherical or oval and are 4μ to 6.5μ in diameter; eight merozoites are finally formed within them. The organism appears to be an independent parasite of the lungs of certain vertebrates, and to be unconnected with any trypanosome.”

H. B. F.

SMITH (Theobald). **Aberrant Intestinal Protozoan Parasites in the Turkey.**—*Jl. Experim. Med.* 1916. Mar. Vol. 23. No. 3. pp. 293–300. With 1 plate.

The parasite was found in a single turkey, which was raised with eighteen others in an incubator and brooder. When about two months old, it appeared quiet and sleepy and refused food. It was killed for examination. The autopsy showed no lesions of “blackhead”; there was a distinct increase in mucus in the caeca, and several coccidian oocysts were passed in the faeces when the bird was dying. The duodenal contents were markedly yellow in colour. Examination of fixed and stained intestinal tissue “showed the presence of peculiar bodies in the subepithelial tissues of the villi of the small intestine, which were tentatively diagnosed as the asexual or schizogonic cycle of some coccidium.” The author considered the habitat of the parasitic bodies to be apparently unusual, as they were more numerous “in the adenoid tissue of the mucosa” than in the epithelial layer, where they appeared to him to be intercellular. He also considers that the parasite of blackhead “is a purely connective parasite and does not enter epithelial cells at any time.”

In sections of the caeca of the turkey two small areas occurred within which “nearly every epithelial cell contained minute protozoa which on further study were diagnosed as true coccidia.” These parasites were young forms, and the author “is inclined to regard these epithelial cell parasites as belonging to a species distinct from that in the subepithelial tissue, and perhaps the same as the species represented by the oocysts found in the contents of the large intestine at autopsy.”

The author discusses the frequency of the occurrence of stages of coccidia in the subepithelial regions of the intestine, but reaches no decision on the subject. Whether the parasite of blackhead be a coccidium or not, the author acknowledges that in the raising of turkeys losses due to avian coccidiosis will occur. The paper is illustrated by four somewhat indistinct photomicrographs [which—as far as it is possible to judge—show trophic and schizogonic stages of *Eimeria avium*].

H. B. F.

CHATTON (Edouard) & BLANC (Georges). **Précisions sur la morphologie de l'hématozoaire endoglobulaire de la Tarente: *Pirhemocyton tarentolae* Chatton et Blanc.**—*C. R. Soc. Biol.* 1916. Jan. 22. Vol. 79. No. 2. pp. 39–43. With 1 fig.

The authors have re-examined their material containing the endoglobular parasite of the gecko named by them in 1914, *Pirhemocyton tarentolae* [see this *Bulletin*, Vol. 5, p. 290.] The principal forms of the parasite are stated to be (a) spherical with diffuse chromatin (1μ to 4μ); (b) amoeboid with massive chromatin (2μ to 4μ); (c) spherical with granular peripheral chromatin (3μ to 5μ). There are also pyriform parasites and a few leishmaniform types considered by the authors to be of no particular significance. No multiplicative and no extra-globular stages have been observed. A refringent globoid body, independent of the parasite but nearly always accompanying it, also occurs in the host erythrocytes. The systematic position of the parasite is doubtful.

H. B. F.

CARINI (A.) & MACIEL (J.). **Quelques hémoparasites du Brésil.**—*Bull. Soc. Path. Exot.* 1916. Apr. Vol. 9. No. 4. pp. 247–265.

The present paper deals with the haemoparasites of birds of Brazil, the greater part of the work having been done on dry smears of the blood of birds that had been shot, so that practically no observations of the living organisms were possible.

The first section of the memoir is occupied with descriptions of 18 microfilaria, mostly observed in different hosts. A section on the Protozoa follows.

Five trypanosomes are briefly described, their dimensions being given in a table. Thus, the trypanosome from *Tyrannus melancholicus* has a total length of 27.5μ and a maximum breadth of 4.5μ . The free flagellum is 9μ long and is delicate. Two forms of trypanosome from *Chamaea brevicauda* are described, a long thin form and a shorter broader one. The organisms measured 22μ to 26μ in total length, are 2.5μ to 4.5μ broad and possess an almost indistinguishable undulating membrane. The trypanosome from *Aaptus chopi* has a breadth of 8.5μ , its length is uncertain and it is very rare, the description being based on a single specimen. The trypanosome from *Cacicus chrysopterus* is remarkable in that at the base of the undulating membrane there is a band giving the impression of a second flagellum, which is perhaps comparable with the supporting structure of the undulating membrane of *Trichomonas*. This trypanosome has a total length of 31μ and a breadth of 5μ . The trypanosome of *Turdus*

rufiventris exhibits broad and narrow forms, is sinuous and has a very delicate flagellum. A list of Brazilian birds known to harbour trypanosomes is given.

Halteridium (or Haemoproteus), which is very common in Brazilian birds, has been found by the authors in ten different avian hosts. A table is given showing the form of the parasite, the character of the pigment produced and the alteration in the host cell. Three new avian hosts of Plasmodium (or Proteosoma) have been found. The parasites were of the usual type. Some deformation of the host cells occurred, and in *Colaptes campestris* and *Rhea americana* there was decoloration of the erythrocytes, but in *Synallaxis ruficapilla* there was no such decoloration.

Six new avian hosts of Toxoplasma (or Haemogregarines ?) are recorded. In morphology and biology the organisms resemble those described by other authors. The parasites multiply in the epithelial cells of the intestine, in the liver and especially in the lungs. The invaded host cells do not seem to be markedly affected by the presence of the toxoplasmas, which seem to be non-pathogenic. Transmission experiments, using pigeons and other birds, have so far been unsuccessful, as have also attempts at culture. Infection with *Toxoplasma avium* is believed to be fairly common among Brazilian birds.

H. B. F.

RODHAIN (J.). **Note sur les Trypanoses et les Piroplasmoses des grands animaux de l'Ouellé.**—*Bull. Soc. Path. Exot.* 1916. Feb. Vol. 9. No. 2. pp. 95-109. With 1 fig.

An examination was made of the parasites found in the larger domestic and wild mammals occurring in the north-east of the Congo basin. The trypanosomes were of the types *T. vivax* (cazalboui), *T. congolense* and of the large *T. ingens*. The last named was found in *Cephalophus dorsalis*. A table is given showing the distribution of the flagellates among the animals examined.

Six *Glossina fusca*, out of 26, were found to be parasitised with flagellates. In four of these flies multiplication of the flagellates was limited to the proboscis, in the remaining two the parasites were multiplying in the intestine and had advanced as far as the proboscis tube. The salivary glands were not infected. Complete development of the trypanosome occurred in the tsetse proboscis in one case only. The flies were caught in the forest, on the bodies of dead elephants or buffaloes.

Among the Piroplasmidae found were *Piroplasma bigeminum*, *Theileria mutans*, *Theileria ovis*, n. sp., and *Piroplasma canis*.

Theileria ovis is characterised by the rarity of bacillary forms, nearly all those seen being rounded or ovoid. Cross-forms were observed, and multiplication was seen in heavily infected blood. No developmental forms analogous to those of *Theileria parva* were found in the organs of infected sheep at autopsy. The degree of pathogenicity appears to be slight and trypanblue seems to have but a feeble action on the parasite. This organism appears to be quite distinct from European ovine piroplasmata.

A list is given of the principal blood-sucking Diptera attacking mammals in Ouellé. They belong to the Stomoxydinae, Pangoninae and Tabaninae.

H. B. F.

KOLMER (John A.) & SMITH (Allen J.). **The Bactericidal and Protozoacidal Activity of Emetin Hydrochlorid *in vitro*.**—*Jl. Infect. Dis.* 1916. Mar. Vol. 18. No. 3. pp. 247-265.

The bactericidal action of emetin hydrochloride was studied *in vitro*, in fluid and solid culture media, on *Staphylococcus aureus*, *Streptococcus salivarius*, *B. typhosus*, *B. anthracis*, and *B. subtilis*. The protozoacidal action was studied on *Trypanosoma lewisi*, *T. equiperdum* and *Endamoeba gingivalis*.

Dilutions of pure phenol were used as control germicide in the case of bacteria, and normal salt solution was used in control preparations of Protozoa.

When *Endamoeba gingivalis* was attacked by emetine it assumed a hyaline and relatively opaque appearance, the clear ectoplasm first manifesting the change. Fresh amoeba-bearing pus from pyorrheal pockets mixed with equal parts of weak solutions of emetine in normal saline of varying strengths was observed. It was found that after the action of emetine of strength 1 in 409,600 the amoebae were motile, hyaline and showed pseudopodia after two hours, but at four hours and six hours became motionless, hyaline and rounded. The authors, however, "are unwilling to say at what time and at what dosage death of the amoebae takes place."

The influence of emetine on spirochaetes in thick emulsions of pyorrheal pus was also studied. On the basis of motility alone, dilutions of emetine from 1 in 400 to 1 in 12,000 seemed to exert spirochaeticidal action.

The trypanocidal effect of emetine was tested in subinoculated white rats. The blood was diluted with warm saline-citrate solution so as to show at least 10 trypanosomes in a field of the microscope ($\frac{1}{8}$ inch objective and No. 4 eyepiece of Leitz). Various dilutions of emetine were mixed with equal quantities of trypanosome emulsions. It was found that "a dilution of emetine of 1:25,000 was destructive for *T. lewisi* and a dilution of 1:6000 for *T. equiperdum*."

The authors' conclusions are :—

"Emetin hydrochlorid possesses bactericidal properties, but prolonged contact with bacteria is required before this action becomes apparent. A 5 per cent. solution of emetin failed to kill *B. typhosus* in 15 minutes, but with a special technic, in which the drug remains in contact with the test microorganisms, emetin proved about equal to, or even on occasion five times more antiseptic and germicidal than corresponding dilutions of pure phenol.

"The bactericidal activity of emetin is more apparent in fluid than it is in solid culture media.

"In an emulsion of pus and various bacteria from pyorrhea alveolaris a 2 per cent. solution of emetin required 45 minutes to effect sterilization, whereas a corresponding dilution of phenol proved germicidal in five minutes or less; a 0.5 per cent. solution of emetin required 1½ hours, and a corresponding dilution of phenol, 45 minutes, to sterilize the emulsion.

"Emetin hydrochlorid possesses trypanocidal properties *in vitro*, but this action is probably less vigorous than is its amebacidal action.

"Emetin is highly amebacidal, producing a marked structural change in *Endamoeba gingivalis* when applied in direct contact, even in high dilution.

"Emetin hydrochlorid probably exerts some bactericidal action when applied locally in the treatment of pyorrhea alveolaris; but its bactericidal activity must be entirely secondary in importance to its amebacidal action, in view especially of the beneficial results and the disappearance of amebae following the hypodermatic use of the drug in the treatment of pyorrhea alveolaris and amebic dysentery when the drug is highly diluted in the body fluids.

"In view, however, of the probable bactericidal value of emetin when applied locally it would appear that the logical treatment of pyorrhea alveolaris should consist primarily in its local application combined with hypodermatic administration, especially in severe infections or in those accompanied by systemic complications."

H. B. F.

KOLMER (John A.) & SMITH (Allen J.). **The Bactericidal and Protozoocidal Activity of Emetin Hydrochlorid in vivo.**—*Jl. Infect. Dis.* 1916. Mar. Vol. 18. No. 3. pp. 266-276.

In the part of the paper relating to experiments on the Protozoa the authors state that "the amebacidal action of emetin was of minor importance in this investigation by reason of the large amount of work that had been done in this direction." The authors experimented hypodermically with *Endamoeba gingivalis*. It has been found that 0.016 to 0.065 gm. (i.e., 1/4 to 1 grain) of emetine is sufficient to exert amebacidal action.

The action of emetine on trypanosomes, *T. equiperdum* and *T. lewisi* in white rats, was also investigated. Such action is slight.

The authors' conclusions are :—

"Emetin hydrochlorid administered intravenously to rabbits in doses varying from 0.065 to 0.52 gm. (one to eight grains) per 132 pounds of body-weight exerted slight or no antiseptic or germicidal influence on a virulent culture of *Staphylococcus aureus*; abscesses developed in the internal organs of the majority of experimental animals.

"Emetin hydrochlorid administered intraperitoneally to mice in doses varying from 0.065 to 0.25 gm. and 0.975 gm. (1 to 8 and 15 grains) per 132 pounds of body-weight exerted no appreciable inhibitory or germicidal action on anthrax and tetanus bacilli.

"Emetin hydrochlorid administered intravenously to white rats, infected 24 hours previously by intraperitoneal injection with *T. equiperdum* and *T. lewisi*, in doses varying from 0.065 to 0.78 gm. (1 to 12 grains) per 132 pounds of body-weight, appeared to exert a slight trypanocidal influence, which was most apparent in the experiments with *T. equiperdum*.

"Emetin hydrochlorid is highly and specifically amebacidal *in vivo*, and its curative effects in amebic infections is to be attributed practically solely to this action. While the drug has slight bactericidal powers *in vitro* under the conditions of prolonged contact with micro-organisms, and while this germicidal action may enhance the value of emetin in the treatment of amebic infections by local application, in the light of our experiments this bactericidal action is not in evidence *in vivo*.

"These observations constitute additional evidence of the active rôle played by *Endamoeba gingivalis*, Gros., in the pathogenesis of pyorrhea alveolaris; improvement or cure of this disease with emetin by subcutaneous injection is to be attributed solely to its amebacidal action. In the treatment with local applications of the drug the beneficial results are to be ascribed in most part to this same influence, although here there is reason to believe that the beneficial effects are, to some degree at least, due to a coincident bactericidal influence on the part of the drug."

- CHATTON (Edouard) & BLANC (Georges). i. *Cryptoplasma rhipicephali*, n. g., n. sp., protiste endoparasite de la tique, *Rhipicephalus sanguineus* du Gondi: *Ctenodactylus gundi*.—*C. R. Soc. Biol.* 1916. Feb. 5. Vol. 79. No. 3. pp. 134-138. With 2 text-figs.
- ii. Un Pseudo-parasite *Cryptoplasma rhipicephali* Chatton et Blanc.—*Ibid.* May 20. No. 10. p. 402.

i. The authors have found a new parasite in the tick *Rhipicephalus sanguineus*. The work was done in Tunis in 1914 and the ticks were found on the gondi. The new protistan parasite was found only in stained preparations made from nymphs of the ticks. It has not been seen *in vivo*, and its exact location in the tick nymph is uncertain. The parasites seen were all at one stage of development. They are slightly arcuate bodies, measuring 55μ to 56μ long by 5μ broad, and are flexible. Each organism contains cytoplasm and is surrounded externally by a cyst wall, outside which is a curious helicoidal chromatic tract, which may possibly represent the nuclear remains of a host cell. The name given to this organism is stated to be provisional.

ii. In this note the authors state that the structures previously described by them as *Cryptoplasma rhipicephali* were really the spermatozoa of the tick, *Rhipicephalus sanguineus*.

H. B. F.

MALARIA.

- WESSELHOEFT (Conrad). i. **The Early History of Malaria.**—*New Orleans Med. & Surg. Jl.* 1916. May. Vol. 68. No. 11. pp. 693-701.
- ii. **The Discovery of the Cinchona Bark.**—*Ibid.* pp. 702-714.
- iii. **The Introduction and Early Use of Cinchona Bark.**—*Ibid.* pp. 715-727.

These three instructive and very ably written essays being almost exclusively of historic and literary interest defy all attempts at condensation. They are a treat to read, and the references appended to each are valuable.

i. The first, dealing with the early history of periodic fever, starts with the conjectures which have sought to explain the fables of the Lernean Hydra overcome by Hercules, and the mud-begotten Python slain by Apollo, as misty traditions of the subjugation of malaria. The author thinks them fanciful, and indeed they are much on a level with the ratiocination of those sages who discern in Mistress Quickly's remark "Hang hog is bacon," and Pistol's exclamation "Pauca, there's enough," the culminating proof that the author of these famous characters was Lord Bacon. HIPPOCRATES and his conclusive nomenclature of intermittent fevers are touched in, and the speculations of W. H. S. JONES, the annals of CELLI, and the observations and surmises of numerous ancient and mediaeval writers are noticed, down to SPIGELIUS who brings the prae-cinchona period to a close. Among the miscellanea mention is made of the Hindu legends of terrible mosquitoes whose bite, as painful as the serpent's, causes fever, shivering, and other dolours. The essay concludes with an historical sketch of the treatment of fevers, from HIPPOCRATES to SPIGELIUS.

ii. Coming to the cinchona period the author in his second essay tackles the question of the original discovery of the medicinal value of cinchona-bark, and in the true scientific spirit eschews the *a priori* method and sticks to historical fact. He reviews in chronological order the relevant statements of the explorers and naturalists (including such celebrated names as JUSSIEU, von HUMBOLDT, TSCHUDI, Clements MARKHAM) who have recorded their travels in South America, and notices that all of them except von HUMBOLDT and (with certain geographical limitations) Clements MARKHAM, agree that the Indians were quite familiar with the properties of the bark and commonly used it as a febrifuge. HUMBOLDT alone states that he never saw the bark used by natives except those employed by Spaniards as bark-peelers; that for the cure of ague the unsophisticated Indians used lemon, coffee, and the fruits and infusions of other plants; and that it was the Jesuits who, being accustomed to distinguish trees by chewing the bark, first noticed the bitterness of cinchona and then experimented with it therapeutically. The statements of Clements MARKHAM are ambiguous: since the bark is not mentioned either by the Inca Garcilasso or by Acosta in their lists of Indian medicines, and is not found in the wallets of itinerant native doctors who are soaked in centuries of tradition, he is convinced that it was not known to the Incas, though he states that it was known as quina-quina and used as a febrifuge in the province of Loxa.

The author mentions the story of the Countess of Chinchon, a vicereine, who herself was cured by bark and afterwards introduced it into Europe, but he also notices that history is uncertain whether the Countess of Chinchon—if indeed she were the undisputed personage of the story—ever returned to Spain. He evidently has his doubts, though he is far from placing the story in the same category with the legend of the ague-stricken lion that was seen chewing the bark, or the legend of the fever-distracted Indian who promptly recovered after perforce drinking water from a pool into which some cinchona-trees had fallen, which are the indigenous originals of the discovery of the medicinal value of cinchona.

After reviewing all the evidence the author accepts the belief that the Indians were the original discoverers, and that the Spanish conquerors adopted the use of the bark from them. As to HUMBOLDT's theory, the author pertinently remarks that if the Jesuits had made the discovery that powerful and dexterous Order would have claimed it and probably would have canonized the discoverer.

iii. The third essay treats of the early use of cinchona bark on the continent of Europe and in England, and begins by pointing out that according to a letter written by a Spanish physician, D. Joseph VILLEROBEL, and quoted by Sebastian BADUS in his *Anastasis Corticis Peruviae seu Chinae Chinae Defensio*, the bark was first brought to Spain in 1632, and not, as is commonly believed, by the Countess of Chinchon in 1640. The author then gives an account, replete with humour, of the controversies over the utility of the new drug; for, like some other great discoveries, from the days of William HARVEY to those of Joseph LISTER, the discovery of cinchona was at first treated with considerable reserve by the profession. The pope, the Jesuit monopoly, and the enormous prices given for "Jesuit's Powder" are mentioned, and a good deal of attention is given to the manner in which the bark was administered, and its effects explained and criticised, by SYDENHAM and his contemporaries. The author recognizes in SYDENHAM's final advocacy of small and frequent doses in the period of intermission "a method which, in the case of quinine, is now being employed by the foremost authorities on malaria."

A. Alcock.

i. BREINL (A.) & PRIESTLEY (A.). **Malaria contracted in New Guinea by Members of the Expeditionary Force and its Treatment.**—*Med. Jl. Australia*. 1916. Jan. 29. Vol. 1. 3rd Year. No. 5. pp. 91-95.

ii. MEDICAL JOURNAL OF AUSTRALIA. 1916. Jan. 29. Vol. 1. 3rd Year. No. 5. p. 106.—**The Malaria Problem.**

i. This is a critical paper reviewing the known behaviour and microscopical features of the several malarial parasites, and the clinical treatment of malarial fever, in relation to thirty cases where in spite of free use of quinine recurrences of fever were long persistent. In 13 of the cases malarial parasites were found, in eight there was only clinical evidence of latent malarial infection, and in nine there was merely a history of repeated attacks of intermittent fever.

The authors conclude that in every case treatment must be adapted to the individual, after the type and severity of the infection has been

determined, and that for a permanent cure large doses of quinine must be continued for a prolonged term. A cure may be facilitated by the auxiliary employment of organic preparations of arsenic.

ii. An abstract of the deliberations of a conference held in Sydney to consider the best means of dealing with soldiers returned from service in malarious regions abroad.

The conference came to the conclusion that—apart from the areas where malarial fevers and the conditions that give rise to them are already known to exist—there are, so far as present information goes, only three places in the Commonwealth, namely Cairns and Port Douglas in Northern Queensland and Overland Corner in South Australia, where *Anopheles* are much concentrated, and that only in Overland Corner is there any contingency of the *Anopheles* becoming infected from returned soldiers still harbouring malarial infection.

The conference recommended, *inter alia*, that an *Anopheles* survey of the irrigation districts of the Murray and Darling Rivers should be undertaken, and that all returned soldiers who have been infected on foreign service should be segregated in one place where they should undergo a specified course of treatment, their pay being continued for three months.

A. A.

VON ELDORF (H.). **Endemic Index of Malaria in the United States.**—*U.S. Public Health Rep.* 1916. Mar. 31. Vol. 31. No. 13. pp. 819-828.

The original parts of this paper consist mainly of tables and summaries relating to the malaria-index, as determined by blood-examination, in six of the Southern states, namely Alabama, Arkansas, North and South Carolina, Mississippi, and Virginia, during the years 1912-1915. Of the 13,526 blood-examinations made 13.28 per cent. showed malarial parasites (8.08 per cent. among whites, 20.6 per cent. among coloured people), the percentage of these carriers being highest among the one to three-year-olds, and lowest among the ten to 14-year-olds. The extremes of age in which infection was observed were 9 months and 85 years. The prevalent type of infection was benign tertian. It is estimated that gametocytes were present in one of every four of the infected.

A. A.

ARMAND-DELILLE, PAISSEAU & LEMAIRE (H.). **Notes sur quelques cas de paludisme primaire observés en Macédoine.**—*Bull. et Mém. Soc. Méd. des Hôpît. de Paris.* 1916. Mar. 3 ser. 32 Ann. No. 7-8. pp. 281-289.

In these notes of cases of primary malarial infection of soldiers of the French expeditionary force in Macedonia six variations from the ordinary type of malarial fever were noticed, and the authors comment on the difficulty of diagnosis apart from a systematic investigation of the blood for malarial parasites. In the commonest variety—a benign tertian infection—the most prominent symptoms were those of gastric derangement. In another class, also benign tertian, the initial symptoms and signs suggested localised inflammation of a lung. In another, malignant tertian, the patient was comatose, profoundly anaemic and

somewhat jaundiced. In another, also malignant tertian, in addition to coma, rapid anaemia, and violent headache, the patient had tremors and at times was semi-delirious. In another, also malignant tertian, these typhoid symptoms were followed by persistent loss of memory and mental troubles. One case was truly typho-malarial, *Plasmodium vivax* and *Bacillus paratyphosus* A being coexistent in the blood.

A. A.

RATHERY (Francis) & MICHEL (R.). *Le paludisme dans un coin des Flandres.* — *Paris Méd.* 1916. Apr. 22. Vol. 6. No. 17. pp. 394-402. With 15 charts.

Flanders having been in former times notorious for terrible epidemics of malarial fever, it was reasonable to fear that the recent massing of troops there—some of them brought direct from infected regions—and their deadly life in trenches in country much of which had, for strategic reasons, been inundated, would have duly been followed by an epidemic of malaria. That this did not happen may be attributed to the perfect (*merveilleux*) sanitary conditions resulting from the judicious and extremely thorough hygienic precautions taken. A few cases, however, have occurred, and this paper contains an abstract of 28 that fell under the authors' observation between February and December (1 each in February, May and December; 2 in July; 3 in September; 6 each in June and August; 8 in October) in all of which the diagnosis was specifically verified by examination of the blood, nine of them being subjects who had never been exposed to the risk of malarial infection before, and the antecedents of six being doubtful in this particular.

[Twenty-nine cases in which the examination of the blood was negative or the diagnosis otherwise dubious are mentioned.]

In some of the 28 cases rosettes were found and in one case crescents, but in most only amoeboid forms were seen. The clinical types were simple intermittent; continuous with exacerbations and with typhoid tendencies; malignant, simulating typhoid (one case, a primary infection); haematuric with bilious vomiting (two cases, both having lived in the colonies), and what the authors call "larval" forms of malaria, where the suggestive symptoms are gastro-intestinal, or bronchitic, or pulmonary; finally, in two cases, *Bacillus paratyphosus* B was also found in the blood.

All the cases yielded to quinine, though generally it was necessary to resort to [? hypodermic] injection, which did not cause unbearable pain.

A. A.

RANKIN (A. C.). *Simple Tertian Malaria in French Flanders.* — *Lancet* 1916. May 27. pp. 1079-1080.

An interesting paper, showing that the presence among the British forces in Flanders of men who had recently been in a malarious country and in some instances were actually known (by blood-examinations made between April and the middle of July) to be infected with malaria, was followed (between July 26th and November 19th) by infection of men who in some instances had never been out of the British Islands before.

It was known to the writer that malarial fever was common in Flanders in former times, and also that an approved carrier-mosquito (*Anopheles maculipennis*) was active on the spot, but he considered that the infection of the insect would be hindered by the climate.

It is an interesting confirmation of established doctrines that though of the men who carried the infection into Flanders some—the great majority of those examined—harboured *P. vivax* and some—a very few of those examined—*P. malariae*, the men who contracted the infection in Flanders for the first time all had *P. vivax*.

A. A.

GENOVESE (Francesco). **Il bacino malarico del Neto e il Marchesato cotroneo.** [The Malarial Basin of the Neto, and the Marquisate of Cotrone.]—*Malariologia*. 1916. Feb. 29. S. 2. An. 2. No. 1. pp. 10-22.

An interesting account of the present state of the ancient town of Crotona, in the south of Italy, famous for its strong men, like Milo, and for the ability of its physicians. The whole district of which Crotona, the modern Cotrone, is the centre, is ravaged by malaria, and the condition of the inhabitants is miserable in the extreme. The country is chiefly cultivated by migratory labourers.

J. B. Nias.

O'CONNELL (Matthew D.). **The Meteorology of Malaria. Disappearance of Malaria from England.**—*Jl. Trop. Med. & Hyg.* 1916. Mar. 15. Vol. 19. No. 6. pp. 65-68.

The author of this paper is not altogether disposed to accept the generally received opinions that the malarial fevers so common in certain parts of England in former times were caused by blood parasites transmitted by mosquitoes, and that the freedom of England from malarial fevers at the present time is due to the banishment of malaria-carrying species of *Anopheles* from houses by a general improvement of sanitary conditions.

His argument is that since malarial parasites are still imported annually in abundance by infected persons returning from malarious countries, and since malaria-carrying species of *Anopheles* are still common in those parts of England that used to be malarious, the disappearance of malarial fevers must be due to some other independent cause. The unqualified verbal predicates that both "malarial parasites" and "*Anopheles* mosquitoes" may still be found in England are quite sufficient for the author's argument: the crucial question whether human beings harbouring parasites of a particular species and *Anopheles* mosquitoes that are hospitable to that particular species are common occupants of dwelling-houses at the present time—either together or even singly—anywhere or at any season in this country is ignored.

In his search for a cause independent of malarial parasites and *Anopheles* mosquitoes the author at any rate succeeds in illustrating the whimsical conclusions that may be reached by pure deductive reasoning when the premises are not based on fact.

Starting with an assumption that there is some direct relation between body-temperature and the physical conditions of the

atmosphere, the author concludes that a hot, humid, and stagnant atmosphere causes a rise of body-temperature which is synonymous with fever.

The conclusion reached from this fallacious assumption is then manipulated to explain that since a rise of body-temperature is the direct result of heat combined with humidity of atmosphere, and since the atmosphere of the English fen-country, formerly so malarious and humid, has become less humid as a result of drainage, therefore the disappearance of malarial fevers from the fen-tracts is directly due to the reduced humidity of the atmosphere.

The author believes that atmospheric conditions which raise body-temperature above normal do still occur in this country—though seldom—in the months of July, August, and September. Still more seldom they may recur on consecutive days, or on the second or third day, and thus are to be explained those rare cases of intermittent fever and ague in persons who have never been out of England. But the author does not explain why such cases should necessarily be rare, since by the hypothesis one would expect a large part, if not the whole, of the population of the particular locality exposed to the postulated conditions to be equally affected.

A. A.

DI PACE (I.). *Per la diagnosi della malaria latente.* [The Diagnosis of Latent Malaria.]—*Morgagni*. 1915. July. Vol. 57. Pt. 1. No. 7. pp. 266-280; Aug. No. 8. pp. 281-308.

The author, in this paper, passes in review the various attempts which have been made to diagnose latent malarial infection by means of deviation of complement and points out their want of success. He then draws attention to the use of the salts of berberin, and strychnine as diagnostic agents. Both are reputed to cause contraction of the spleen, and in this way to expel into the blood stream any parasites which may be lurking there. A positive result is evidenced by fever, or the parasites may be detected by a blood examination with the microscope. The dose of berberin is from .80 to 1.0 gramme of the chlorhydrate for an adult, and half that quantity for children. The dose should be repeated for four doses at hourly intervals. By this means the author was able to get a positive result in 9 out of 16 persons who gave a history of having had malaria. The salt of strychnine preferred by the author is the nitrate, which should be given hypodermically in doses of 2 to 3 milligrammes for an adult, or by the mouth in doses of 2 to 4 milligrammes. The number of persons tested by the author in this way amounted to 136, with a positive result in 38, or 27 per cent. The blood, if examined, should be taken from the lobe of the ear from one to two hours after the dose of strychnine or berberin.

J. B. N.

ARMSTRONG (E. Randolph). *The Value of Differential Blood Counts in the Diagnosis of Malaria.*—*Ann. Trop. Med. & Parasit.* 1916. Apr. 29. Vol. 10. No. 1. pp. 85-130.

A lucid and discriminating paper, tabulating, correlating, and generalizing observations extending over a term of 21 months, and

properly ratified by exact definitions of terms and by specification of errors actual and contingent. The conclusions expressed by the author are that the increased proportion of large uninuclear leucocytes in malarial blood is a phenomenon so constant as to be trustworthy evidence of malarial infection, and so persistent as to be proof of infection after the parasites have disappeared from the blood stream and can no longer be discovered by feasible methods.

The differential characters accepted for the large uninuclear leucocyte are, that it must be at least as big as the largest polymorphonuclear visible; that the nucleus, which is woolly in appearance and either ovoid or reniform but very rarely squarish and *never circular*, must show less depth of stain than the nucleus of any other white cell in the film (excluding the mast cell when its nucleus fails to stain), the colour, with Leishman's stain, being of a cherry-violet as opposed to the bluish-purple of the large lymphocyte; chromatin granules should be present (but may be obscured by the nucleus), usually as triangular chips, but sometimes as dots, to a number rarely exceeding ten; the protoplasm should be clear, either not stained or faint blue, and if the protoplasm have escaped by rupture the envelope remains recognizable; furthermore, in malaria, pigment can often be seen within the protoplasm. Two rare cells—the transitional and the endothelial—were numbered with the uninuclears. "Broken" nuclei present a difficulty, for though their presence in excess is said to be due to rough manipulation they cannot be altogether avoided; the author should perhaps have been content to state the fact that he observed them to be more numerous in malarial than in other blood and to take the same shade of colour as the nuclei of the large uninuclears, for his other arguments for assigning them to the uninuclears merely beg the question.

A. A.

LEIGHTON (W. E.) & MOELLER (Fred). **A Case of Spontaneous Rupture of the Malarial Spleen.**—*Jl. Amer. Med. Assoc.* 1916. Mar. 4. Vol. 66. No. 10. pp. 737-738.

The patient was admitted into one of the General Hospitals of the British Expeditionary Force from the trenches, where he had been taken ill with "chills," fever, headache, and pains in the abdomen and chest. On his way to the hospital he had a severe attack of pain, beginning in the epigastrium and spreading over the whole abdomen.

The only notable events in his past history were a severe attack of dysentery, preceded by sudden abdominal cramps and followed by "chills," which had occurred in India three years before; an attack of "chills" and fever while on his way back to England two years after that; and an attack of vomiting, which lasted for two days, when he landed in England.

On admission he was wasted and anaemic, with a subnormal temperature. There was dulness of the lower part of the right side of the chest, some displacement of the heart to the left, and tenderness over gall-bladder, epigastrium, and appendix.

The symptoms for two or three days after admission were fever and frequent attacks of pain simulating gall-stone colic, terminating, after a very severe attack, in collapse. An examination of the blood gave

The authors write with some reserve about the prophylactic use of quinine; what they consider adequate is 2 grammes a week taken during two consecutive days in doses of 0.25 grammes every six hours.

A. A.

DEEKS (W. E.). *Treatment and Complications of Malaria.*—*Southern Med. J.* 1916. May. Vol. 9. No. 5. pp. 420-426.

This paper generalizes the experience of about 50,000 cases of malarial fever treated under the author's supervision in the Canal Zone during seven years. Eighty per cent. of the cases were malignant tertian, only 1 per cent. was quartan.

"One specific drug is known for the treatment of malaria, and that is quinine" is the author's widest generalization. "In the vast majority of cases administration by the mouth meets every requirement" is another broad conclusion, coupled with the proviso that it be given in solution, and not in pills or tablets.

In ordinary cases the best results were obtained by giving 15 grains three times daily until the temperature had remained normal for three or four days, when the dose was diminished to 10 grains three times daily for a week, and then to 20 grains daily for another week. These large doses were for the most part tolerated. On the day of admission a routine treatment of three grains of calomel followed in eight or ten hours by an ounce of Mag. Sulph. was followed.

In pernicious cases with cerebral congestion the hypodermic method was generally adopted, $7\frac{1}{2}$ grains of dihydrochloride dissolved in 10 cc. of normal saline being injected at intervals of two to four hours, up to a total of 45 to 75 grains.

In some cases of severe infection solutions of quinine diluted "from 250 to 300 times with normal saline" were injected into a vein.

In some grave cases with severe and persistent vomiting and evidences of portal congestion 60 grains of quinine dissolved in 10 or 12 ounces of warm saline injected per rectum gave good results.

In all cases where the drug was injected in any fashion administration by mouth was resumed as soon as possible.

The commonest complication of the quinine treatment was urticaria, sometimes going on to dermatitis, or even, though rarely, to extensive desquamation. Hypodermic injection sometimes led to necrosis in very weak points, but not in normal patients after local massage and the application of a hot bottle. An attack of haemoglobinuria "not infrequently" occurred, sometimes after the administration even of a very small dose of quinine.

The most frequent complication of the disease observed was nephritis, which in the great majority of cases disappeared after convalescence, though sometimes it persisted and ended fatally, with necrosed foci in kidneys, liver, and spleen. Another complication was haemoglobinuric fever, 230 cases of which have already been summarised in a report. Haemorrhages into mucous membranes and extensive purpura were also observed, and jaundice, bronchitis, and anaemia were not uncommon.

A. A.

WRIGHT (T. E.). *Treatment of Malaria Relative to its Eradication.*—*Southern Med. Jl.* 1916. Apr. Vol. 9. No. 4. pp. 313-316.

The author, while realizing the position of the general practitioner, points out that the treatment of malarial fever should include in its scope the prevention of infection by diminishing the number of human "carriers." From his own experience he concludes that intravenous quinine is the likeliest method of "sterilizing" the blood in malaria, and he recommends ten-grain doses dissolved in 20 cc. saline or fresh-distilled water—to be repeated in eight or ten hours once or oftener according to the case—the only contra-indication being pregnancy. The discomfort to the patient is slight, and in 258 cases no unfavourable effects were noticed, while the direct therapeutic results were prompt, constant, and entirely satisfactory.

A. A.

MINERVINI (R.). *Splenectomy per Milza malarica.* [Excision of a Malarial Spleen.]—*Giorn. Intern. d. Sci. Med.* 1915. Dec. Vol. 37. No. 23. pp. 1057-1063.

Notes of a case of successful removal of a hypertrophied malarial spleen.

The author remarks that the removal of malarial spleens should not be attempted until there is reason to believe that they are no longer functional, from degenerative changes, by which time other haemopoietic organs, like the bone marrow and the lymphatic glands, have had time to take on the function of the spleen. In addition it is a distinct advantage, from the operative point of view, to wait until there is an evident prolapse of the spleen, so as to get a good pedicle for ligature. Both these conditions were present in the case under review.

J. B. N.

KING (W. V.). *Anopheles punctipennis, a Host of Tertian Malaria.*—*Amer. Jl. Trop. Dis. & Prevent. Med.* 1916. Feb. Vol. 3. No. 8. pp. 426-432. With 1 plate.

The experiments recorded in this paper were conducted in New Orleans, in one of the laboratories of the School of Medicine of Tulane University. The mosquitoes used were bred in the laboratory, and the specific identifications were confirmed by Mr. KNAB, whose word must be taken as final.

The record shows that of six specimens of *Anopheles punctipennis* fed on a patient whose blood was particularly rich in gametes of the benign tertian form (this being their first feed of blood) five became infected. In the series of five every phase of the sporogeny was traced, from zygotes to sporozoites, the sporozoites being observed on the twentieth day after the original feed.

The record also contains the interesting item that a single specimen of *Anopheles punctipennis* fed on a patient not so heavily infected as the first was found, twenty days after, to contain three oocysts—two unripe and one empty—and some sporozoites in the tip of one lobe of one salivary gland.

A footnote contains the information that, more recently, *A. punctipennis* has been discovered to be an efficient host for the subtertian parasite, the details of the discovery being promised.

The fact that *A. punctipennis* is hospitable to the malarial parasite in New Orleans, although competent workers have failed to infect it in other parts of America, has a significance of very wide application.

A. A.

MITZMAIN (M. Bruin). *Anopheles crucians*. Their Infectibility with the Parasites of Tertian Malaria.—U.S. Public Health Rep. 1916. Mar. 24. Vol. 31. No. 12. pp. 764-765.

It has been stated, on the strength of experiments made in New Orleans in 1902, that the only species of malarial parasites that can develop in *Anopheles crucians* is *P. falciparum*. The experiments recorded in this paper, however, which also were made in New Orleans, do not confirm this limitation of the powers of *A. crucians*, since they give detailed evidence that this mosquito can also be hospitable to the parasite of benign tertian.

Of 19 specimens of *A. crucians* fed on a patient suffering from this form of malarial fever seven died within five days, and three of these seven were found to contain immature zygotes, while in a fourth the vermicle stage was identified. Of the 12 survivors, two were found, on the eleventh and twelfth day after, to have sporozoites in the salivary glands, the infection in one case being heavy.

Of 38 specimens of *A. punctipennis* fed on the same patient 11 became infected six to sixteen days after, the infection of the salivary glands in six of the specimens being very extensive. And of two specimens of *A. quadrimaculatus* fed on the same patient neither became infected.

These interesting experiments teach once more the need of reiterated experiment and prolonged suspension of judgment in determining the relations of any particular species of *Anopheles* to malaria.

A. A.

MITZMAIN (M. Bruin). Tertian Malarial Fever. Transmission Experiments with *Anopheles punctipennis*.—U.S. Public Health Rep. 1916. May 12. Vol. 31. No. 19. pp. 1172-1177.

The experiments here recorded in detail not only confirm those of W. V. KING as to the infectibility of *Anopheles punctipennis*, but also cap them by demonstrating, what easily-satisfied people might take for granted, that the infected *punctipennis* is most potently infective. Three healthy volunteers submitted themselves to the voracity of certain individuals of *punctipennis* that had been infected, some ten, some fourteen days before, from a case of benign tertian; in all three after an incubation period of 14 days the usual pathognomonic symptoms were displayed and the specific parasites were discovered in the blood. As one of the volunteers had been employed some months before in giving suck, without any ill effect to himself, to individuals of *punctipennis* that had been used in an attempt to transmit the subtertian parasite, the author is inclined to suspect that this mosquito may be inhospitable to *P. falciparum*.

A. A.

HOFFMANN (Frederick L.). **A Plea for a National Committee on the Eradication of Malaria.**—*Southern Med. J.* 1916. May. Vol 9. No. 5. pp. 413-420.

For the United States Registration area, which excludes practically the entire rural South, the malaria mortality is 2·6 per 100,000, and for nine representative Southern cities it is 22·1 per 100,000. From calculations and probable assumptions, for which these figures serve as the specific data, the author estimates that in the entire continental area of the United States there occur annually 1,035,000 cases of malaria with 15,520 deaths. Comparative statistics from the records of specified areas reveal the fact that improvements in sanitation have diminished the malaria-mortality in those areas, and while the author admits that much has already been done sporadically and tentatively, he would like to see organized and comprehensive national machinery at work for the abatement and eradication of malaria over the whole country. As a model he suggests the Malaria Bureau of the Indian Government, to include within its scope education, surveys, biological research in its widest sense, statistical studies, and general problems connected with engineering, municipal administration, legislation, etc.

A. A.

VON EZDORF (R. H.). **Demonstrations of Malaria Control.**—*U. S. Public Health Rep.* 1916. Mar. 10. Vol. 31. No. 10. pp. 614-629. With 4 figs.

An interesting record of improvements effected in two small townships by treatment of the breeding-places of *Anopheles*. Roanoke Rapids, in North Carolina, with its two neighbouring villages spreads over an area of about four square miles; the population in 1913 was 4,100, mainly white, employed for the most part in cotton and paper mills. In 1913, before the institution of anti-malaria measures, malarial fever was prevalent in the summer months, the cases visited by local practitioners averaging 50 per diem, and of 400 general blood-examinations made at the end of the fever season 13·75 per cent. showed malaria parasites. *Anopheles* larvae, chiefly *A. quadrimaculatus*, were found in almost every pool, rivulet, and marshy place investigated, and adults of the same species were common in the houses. Popular lectures and school-instruction were given, the streams were cleared of brush, ditches were levelled and cleaned, oil-drips were installed where necessary (and also many inhabitants were induced to use quinine during the fever season). As a result, in 1914 only a few *Anopheles* larvae were to be found, and 780 general blood-examinations made at the end of the malaria season showed only 4·48 per cent. of infections, while in 1915 only a few adult *Anopheles punctipennis* were noticed, the number of cases of malarial fever attended was estimated roughly as one in three days, and in 968 blood-examinations made as before the percentage of infection was only 3·51. The total cost of ditching, clearing, oiling, inspection, etc. was, in the year 1914, 3,683 dollars, and in the year 1915, 1,233 dollars, which, probably, was more than balanced by the value of the labour reclaimed for the mills during the fever season. As a sort of "control" it was observed that among some coloured people living outside the area of the anti-malaria operations 30 general blood examinations made at the end of the malaria season of 1915 showed 20 per cent. of infection.

Electric Mills in Mississippi is a town of timber-mills, in low-lying wooded country, with a good deal of sluggish and stagnant water; the population is mixed, the white residents having their own separate quarter. In September 1912 malarial fever is said to have aggregated 95 per cent. of the total sickness. In 1914 *Anopheles* larvae were found in many places, and 527 general blood-examinations made in May showed 11.76 per cent. of malaria infection. Drainage was improved, hollows were filled in with shavings and sawdust, and some oiling was carried out, with a result that in April 1915 examination of the blood of 211 persons showed only 3.79 per cent. of infection. The cost of the anti-malaria operations in 1914 was 725 dollars, and in 1915 143.80 dollars.

A. A.

SERGEANT (Edmond et Etienne). *Alternance des écoulements d'eau, principe directeur des mesures antilarvaires.*—*Malariologia*. 1916. Feb. 29. S. 2. An. 2. No. 1. pp. 3-9. With 4 figs.

The authors quote the saying of the Algerian colonists, that "in Africa where there is no water one dies of thirst, or, where water exists, of fever," as a text to show that these alternative disasters can be avoided by irrigation so planned as to prevent the breeding of *Anopheles* mosquitoes. This can be effected by having the irrigation channels double, so that each channel can be used alternately for a term considerably less than is necessary for the complete development of an *Anopheles* larva, which in the Algerian summer is three weeks. While the one channel is in use and young larvae may be thriving in it as if no doom were impending, the other dries up and the larvae which have been flourishing in it perish untimely, provided, of course, that its intake had been kept down strictly to the ascertained requirements of irrigation.

In the villages of the colony places for bathing and washing and for watering animals must be kept under surveillance, and useless and intractable channels must be filled in or petrolised.

The idea is obviously sound, but it implies high standards both of intelligence in the colonists and of vigilance, as well as technical efficiency in the irrigation department.

A. A.

BERTOLIO (S.) & MARIANI (A.). *Contributo sperimentale allo studio delle profilassi anti-anofelica*. [An Experimental Contribution to the Subject of Mosquito-Destruction.]—*Morgagni*. 1915. July. Vol. 57. Pt. 1. No. 7. pp. 259-265.

On account of the high price of petrol at the present time, the authors have been experimenting with heavy oil, such as is used in Diesel engines, as a larvicide. They find that a mixture of nine parts of such an oil, of a density of .925, with one of petrol, makes a good proportion. It should be poured upon the water on a hot, calm day so that it may spread uniformly, and the film lasts so long that it is not necessary to apply it to any collection of water more than twice in the year. Naturally such a film is liable to kill fish and to clog the plumage of water-birds, so that it has its drawbacks, but as it is necessary to

apply petrol to surfaces of water once a fortnight at least while the mixture needs to be renewed only twice a year, the cost works out, in Italy, at about only one-tenth that of pure petrol. An Italian heavy oil, of a density of .785, gave equally good results.

J. B. N.

CARTER (H. R.). Malaria. Lessons on its Cause and Prevention. For Use in Schools.—*U. S. Public Health Rep.* Suppl. No. 18. Revised Edition. 1915. Jan. 20. 20 pp. With 23 figs.

In describing what Anopheles mosquitoes are like, where they are found in nature, and how they and their eggs and larvae may be distinguished from mosquitoes of other kinds, and in explaining how by destroying these insects and abolishing or vitiating their breeding-places—as well as by other easily understood means—malarial fevers can be prevented, the object of this illustrated school-catechism is highly to be applauded, and its execution is as much to be admired; the facts can be demonstrated by a capable teacher, and the inferences lie within the limits of a child's mental reach. But the descriptions and figures of malarial parasites, in all stages of their existence, are not so satisfactory; and it is difficult to see how any profitable end, either educational or utilitarian, is to be gained by the introduction of things so remote from the verifiable experience and the assimilative capacity either of school children or of ordinary school teachers.

A. A.

HAY (G. G.). First Measures in Malaria Prevention for Farmers and Settlers. The Role of Nature in the Suppression of Malaria.—*The War on the Mosquito.* Publication No. 11.—45 pp. With 20 figs. S. African Anti-Malarial Association.

Here we have the truth about malaria embodied in a tale that shall enter in at lowly doors, so that he may read that binds the sheaf or builds the house in new-settled tracts.

The author explains the cause of malarial fever, the manner of its transmission, and the usual permanent source of infection for the white man, and describes the appearance and habits of different kinds of mosquitoes and their larvae, and then discusses the choosing of a site, the planning of a house, the treatment of surroundings, and the management of water, so as to escape and to suppress mosquitoes. Much useful advice is also given, on the one hand about screening, mosquito-nets, and mosquito "swatting," and on the other hand about the habits of life, personal hygiene, clothing, and ways of using quinine. Among the illustrations that of a group of Anopheles larvae is particularly good.

If the actions of men were determined by knowledge and reason, this instructive and persuasive pamphlet might banish malarial fever from South Africa.

A. A.

HAY (G. G.). **Malaria Prevention on Active Service. Notes for the Information and Guidance of the Union Troops on Service in Central and East Africa.** [Also in Dutch.]—*The War on the Mosquito*. Publication No. 14.—18 pp. With 6 figs. S. African Anti-Malarial Association.

This little pamphlet explains in simple language the nature and the mode of transmission of malaria, and something of the habits and appearance of the *Anopheles* mosquito, so as to make it plain to the most ordinary intelligence that malarial fever can be avoided under service conditions by individual attention to certain precautions. Different kinds of mosquito-nets, and simple methods of adapting them to the exigencies of service are described, as well as other means of protection from mosquitoes. Some useful repellent applications are mentioned, and the preventive use of quinine is advised.

A. A.

MALCOLM (William). **The Term "Malaria" and its Colloquial Synonyms.**—*China Med. Jl.* 1916. Mar. Vol. 30. No. 2. pp. 97-99.

This interesting paper contains some choice examples of the flowery rhetoric of the far east; of the twenty-two idioms for malaria some, such as "that heavenly thing," are euphemistic; some, like "devil sickness," maledictory; others, like "the every third day cloud," poetical; and one, "the honorable official," is blandly sarcastic and almost defamatory; a few, such as "the mixed infection" are as unexpectedly pregnant as some of Hamlet's replies to Polonius.

A. A.

RELAPSING FEVER AND OTHER SPIROCHAETOSSES.

RUDIS-JICINSKY (J.). *Relapsing Fever in Serbia*.—*New York Med. Jl.* 1916. Apr. 1. Vol. 103. No. 14. [Whole No. 1948.] pp. 643-645.

The author recounts his experiences in Serbia in the neighbourhood of Uskub. He states that "the sanitation was about at zero." There were many cases of relapsing fever in winter contemporaneous with an epidemic of typhus. Microscopic examinations of the blood were made for spirochaetes, which were seen during paroxysms in some cases, but disappeared before the crisis in others. Sometimes inoculation of rabbits was performed. The author and two colleagues became infected, and one succumbed. Neuritis of the extremities sometimes occurred as a sequel. His own symptoms are described. Often the cases showed three pyrexial stages with marked discolouration of the skin. Complications in wounded or in those also affected with typhus are briefly recorded. Lice were the carriers of infection. In the majority of cases there was only one relapse and the malady lasted 18 to 20 days.

"The treatment and general management were simple, including time and use of stimulants and tonics, especially iron, strychnine, and quinine, opposing fever by cold, or applications of snow, brought from the hills far away. We gave Dover's powder for pain or morphine for sleeplessness, if necessary subcutaneously." Good nursing was employed, and care was taken to prevent access of lice to the person.

A. Porter.

DANILA (P.). *Flèvre récurrente à Bucarest*.—*C. R. Soc. Biol.* 1916. May 20. Vol. 79. No. 10. pp. 458-460.

The author has observed two large and one small focus of relapsing fever in Bucharest this spring. In the first centre of infection, 6 out of 11 persons in an unhealthy house became ill. Spirochaetes were found in three during the second relapse but were not looked for in the remaining three cases. In the second centre 40 persons were living in an old house, one fell ill and spread the malady among the others, probably by means of lice. Fourteen persons became infected, of whom three had one relapse, eleven had two, and one had a third relapse. Spirochaetes were found in the blood of ten of the fourteen cases. Two of the patients, before being isolated, formed a third centre of infection for four other persons. Of the latter, three showed spirochaetes in their blood and each had two relapses.

The source of this epidemic has not been determined. All the patients were peasants who had not been away from Bucharest for some months, and it is probable that they had contracted the disease in the city. Refugees from Balkan countries have brought relapsing fever with them to Roumania, but it has been unrecognised until now, being confused with other maladies. Other probable cases of relapsing fever have occurred. The first case in which *Spirochaeta recurrentis* was proved to be present was that of a doctor, who contracted the disease on the Bulgarian frontier in February 1916.

Cultures made on Noguchi's medium gave an abundant growth of spirochaetes in 15 hours. Further details of the culture are promised later.

A. P.

PRUSSIAN. Ueber eine mit Neosalvarsan behandelte Rekurrens-Epidemie. [An Epidemic of Relapsing Fever treated with Neosalvarsan.]—*München. Med. Woch.* 1916. Mar. 7. Vol. 63. No. 10. pp. 344-348. With 16 curves.

The author, who was attached to the Eastern German army, observed an epidemic of relapsing fever in a prison-camp for Russians. There were 127 cases in April, while from the middle of May to the middle of June there were 380 sick. The epidemic was spread by lice. Of those treated, 90·7 per cent. were permanently cured by treatment with salvarsan, but only 54 cases were treated from the commencement of the illness. After the injection the fever remained only two to four days. One patient, who also suffered from malaria, died.

The treatment with neosalvarsan is stated to have been by adding an ampoule containing 0·45 gram of the drug to 10 cc. of sterile distilled water and inoculating it into a vein of the arm.

The curves show the effect on the temperatures of patients when under drug treatment.

[In the title the use of neosalvarsan is indicated but, in the description of the actual treatment, salvarsan is stated to have been chiefly used.]

A. P.

RAGAZZI (Carlo). Un caso di spirochetosi bronchiale (Castellani 1906).—*Pathologica.* 1916. Jan. 1. Vol. 8. No. 172. pp. 1-4.

This paper gives a short historical resumé of some of the literature relating to *Spirochaeta bronchialis*, concerning which organism a long, illustrated paper by FANTHAM recently appeared [see this *Bulletin*, Vol. 6, p. 211]. Reference is also made to MACFIE's findings on the Gold Coast. The present author's observations are restricted to a single case, that of a Bedouin of Cyrenaica, who was in the hospital of the civil prison at Bengazi. The patient was observed for 45 days. Spirochaetes were found in the sputum of the man. They were mostly 7μ to 8μ long, others being 10μ to 11μ , and some up to 12μ or 13μ . Multiplication of the spirochaete by longitudinal division was observed in life, and apparently multiple transverse fission into 7 to 10 elements was seen. Note is made of the general climatic conditions of Bengasi, where the patient was under observation.

A. P.

TORO VILLA (G.). Espiroquetosis broncopulmonar.—*Repert. de Med. y Cirugia.* 1916. Mar. Vol. 7. No. 6. [No. 78.] pp. 250-256. With 1 fig.

The patient in whom bronchial spirochaetosis was studied was a native of Angostura, Colombia, South America. His sputum was muco-purulent, adherent to the vessel, and streaked with blood. Pneumococci were absent. An enormous number of spirochaetes was present in the sputum. They were not of oral origin, as the buccal cavity was thoroughly disinfected before the sputum was examined. The patient received daily injections of 0·3 grammes of neosalvarsan and took an expectorant. The spirochaetes gradually disappeared, and the patient improved in about a month. Acute and chronic cases

of bronchial spirochaetosis have been observed. The acute cases were cured under treatment or reverted to the chronic form. Microscopical examination of sputum is necessary to determine the cause of the disease. The prognosis is good.

A large part of the paper consists of copious quotations of the work of others, principally CASTELLANI and CHALMERS, CHALMERS and O'FARRELL, MACFIE, and LURIE, whose work was confirmatory of that of FANTHAM [see this *Bulletin*, Vol. 3, p. 6; Vol. 6, p. 211; Vol. 7, p. 121]. Apparently the work of the last mentioned author is unknown to the writer in the original.

A. P.

FANTHAM (H. B.). *Observations on Spirochaeta eurygyrata, as found in Human Faeces.*—*Brit. Med. Jl.* 1916. June 10. pp. 815-816. With 1 fig.

Spirochaetes were found by the author in the faeces of soldier patients who had contracted various forms of dysentery or diarrhoea in Gallipoli or Flanders. The organisms were also seen in the stools of a few normal persons. The spirochaetes were found during the routine examination of stools in 1915-16, and although only a few minutes could often be devoted to the examination of a fresh preparation, yet 23 cases of single infection with spirochaetes were detected by this means alone in three months. The use of dark-ground illumination or of stained smears of stools revealed many more spirochaete infections, even as high as 50 per cent. of the cases examined.

The movements of the spirochaetes are described by the author. The motion "may be divided into two components—an undulatory flexion of the body mainly for progression, and a corkscrew or helicoid movement of the body as a whole due to its coiling. The number of waves along the body of a spirochaete varies according to the rate of progression of the organism, and is an index of its rate of motion, being also slightly influenced by its thickness." The body of a rapidly moving form is thrown into many small waves, while slowly moving organisms are thrown into fewer larger waves. Various other movements are recorded. Agglomeration of the parasites is common, the tangles produced being more frequent in fluid stools. When shed epithelial cells from the intestinal wall have been present, spirochaetes have been seen to penetrate them, become quiescent there or even produce resting coccoid bodies; sometimes they were observed to emerge again from the cells.

The morphology of the spirochaetes, *S. eurygyrata*, is described. The length varies from 3μ to 15μ , and the breadth is about 0.25μ . The ends are usually tapering, but vary according to the stage of growth or recentness of division, which is by binary fission. The number of curves or waves seen along the body may vary from two to nine, and is not specific. In well-stained specimens chromatin granules can be seen along the body.

The number of spirochaetes in the stools varies from day to day. The more fluid the stool, the greater is the number of spirochaetes present, as a rule. "During the period when the spirochaetes as such are absent from the stools, it is probable that they have produced granules or coccoid bodies." In the author's opinion "granules

cannot be considered, at present, to be definitely of spirochaetal origin unless their formation from and subsequent elongation and development into spirochaetes have been observed in the living organisms."

The earlier observations, mostly vague, are analysed. These were chiefly made during the years 1884-86 and 1893-94, especially regarding the occurrence of "spirilla" in cholera motions. The *Spirillum hachaizae* of KOWALSKI, of which illustrations and dimensions are lacking, is considered to be too insufficiently defined for the name to be valid. The work of Le DANTEC (1903) on spirochaetal dysentery is noted. The *Spirochaeta eurygyrata* and *S. stenogyrata* of WERNER (1909) are considered to be merely varieties of a single organism. The author amends the *S. eurygyrata* of Werner thus: The organism "has tapering ends, measures up to 15μ long, and is about 0.25μ broad. It contains a diffuse nucleus, consisting of chromatinic granules. The number of coils or waves is variable, depending on the rate of movement and thickness of the organism."

The author's conclusions are:—

"*Spirochaeta eurygyrata*, Werner emend. Fantham, may occur in the stools of dysenteric and apparently healthy persons. The organism, which has pointed ends, measures from 3μ to 15μ in length by about 0.25μ in breadth.

"The so-called spirilla, mentioned by some of the earlier workers as occurring occasionally in cholera motions, are included under the name of *Spirochaeta eurygyrata*.

"The number of coils in a spirochaete is not a specific character but is variable, and is primarily an index of its rate of motion, being also partly dependent on the thickness of the organism."

A. P.

FANTHAM (H. B.). *Spirochaetes and their Granule Phase*.—*Brit. Med. J.* 1916. Mar. 18. pp. 409-411.

This paper contains a concentrated account of the granule phase in the life-histories of various members of the Spirochaetaceæ, more particularly those that affect man. The distribution of spirochaetes in nature and their morphology are briefly described. It is remarked that the number of coils or undulations of a spirochaete is not a specific character, but is rather an index of the rate of motion of the organism, as well as of its thickness. Polymorphism due to the processes of growth and division is usual. Chromatin granules occur along the body. Spirochaetes of vertebrates are transmitted by the direct contaminative method, as in yaws, or by the intermediation of an arthropod vector (as in tick or relapsing fever).

In connection with the granule phase in the life-cycle of spirochaetes, "there is no doubt that spirochaetes produce such granules; it is only their significance, whether cyclical or degenerative, that is in question." The author presents the evidence in respect to both of these opinions. The formation of granules or coccoid bodies in living spirochaetes is described. The cytoplasm concentrates around the minute, refractile chromatin masses. Each small concentration becomes oval, the outer layer differentiates as a thin coat, and ultimately a series of coccoid bodies is produced. These are released by one or more ruptures in, or disintegration of, the perioplast of the parent. "The progressive elongation of the granules, the assumption of the

sinuous form, and the emergence of very small spirochaetes from the groups of granules have been observed in life. It is very probable that there is a definite period in the life of a spirochaete at which there is a marked differentiation of coccoid bodies. It must also be borne in mind that coccoid bodies may be present when spirochaetes as such cannot be detected." Nevertheless, the finding of chromatinic granules alone is not sufficient to justify the inference that spirochaetosis is indicated, as all such granules are not necessarily spirochaetal in origin.

Some workers have considered granules to be degenerative or to be unconnected with spirochaetes. In some cases, an invisible phase, that yet is said to retain the spirochaetal facies, has been postulated. In other cases, it has been alleged that the granules found in ticks transmitting spirochaetes were natural to the tick and had been mistaken for spirochaetal granules. But "it has not been denied that granules may occur in normal tick cells, nor was it asserted that all the intracellular granules in infected ticks were spirochaetal in origin, for the granules seen in arachnid cells are not all of the same nature."

Attention is drawn to the work of SERGENT and FOLEY (1914) on the development of *S. recurrentis* or varieties thereof in *Pediculus vestimenti*. The spirochaete there assumes a very small form which is as virulent as the spirochaetiform stage. NICOLLE and BLANC (1914) also found that the causal agents of relapsing fever are virulent or infective in the louse just before they reappear as spirochaetes.

Granule stages in spirochaetes in the blood of vertebrates have been recorded from time to time. The work of BALFOUR, PROWAZEK, BREINL, FANTHAM, and SERGENT and FOLEY is quoted. The latter workers found that a minute but infective form occurred in the blood of patients suffering from relapsing fever during apyretic intervals when spirochaetes were absent. OBERMEIER and von JAKSCH have observed similar bodies and the development of typical spirochaetes therefrom. The work of FANTHAM (1914-1915) has shown that the coccoid bodies are the means whereby *Spirochaeta bronchialis* is spread from man to man. The historical interest attaching to *Cytoryctes luis* of SIEGEL is noted, these bodies being in all probability granules or coccoid bodies shed by *Treponema pallidum*.

Finally, some effective evidence for the transition and growth of granules or coccoid bodies into spirochaetiform organisms has been afforded recently by the work of NOGUCHI, BALFOUR and LEISHMAN. The last-mentioned worker has seen the definite extrusion of small actively motile spirochaetes from granule clumps. The value of the recognition of the granule phase in the Spirochaetacea as stated by NOGUCHI is also quoted. It was the recognition of granules in pure cultures of *Treponema pallidum* that led this well known worker to investigate the brains of general paralytics and spinal cords from cases of tabes dorsalis, whereby the discovery of *T. pallidum* in such cases was brought about and with it the possibilities of more effective treatment.

A. P.

NOGUCHI (Hideyo). Certain Alterations in Biological Properties of *Spirochaetes* through Artificial Cultivation.—*Ann. Inst. Pasteur.* 1916. Jan. Vol. 30. No. 1. pp. 1-4.

The author points out that certain cultures formerly considered to be those of *Treponema pallidum* differed from those of the true organism in being putrefactive and avirulent. It is now certain that an odour-producing *Treponema* is not *T. pallidum*. The main portion of the paper consists of an account of certain modifications occurring in the biological properties of certain treponemes after they have been cultivated for a shorter or longer time on artificial media. The various species have been under observation in cultures for two to four years (since 1910-1912).

"From a morphological standpoint no striking modifications have been observed in these cultures. They still retain their original types. . . . The staining reactions are also unaffected, although the *pallidum*, when grown in a fluid medium, takes up the red component of the Giemsa somewhat more readily than the specimens in the tissue or solid culture media. On the other hand it has been noticed that certain definite alterations occur in their biological properties. In the case of the *pallidum* the virulence disappeared within about four months after its purification. In that of the *pertenue* it was found that the strain I studied lost its virulence as soon as it was freshly isolated in pure culture. The power possessed by the *microdentium* to produce an intense disagreeable odor remained undiminished for nearly one year, but this gradually and almost imperceptibly diminished in intensity and now after two years the odor is scarcely noticeable. In the case of the *mucosum* it was found that its mucin-producing property gradually weakened and finally disappeared within about five months after its isolation. Although the odor-producing property of this species has suffered a more gradual diminution in the course of a prolonged life in culture, nevertheless it is distinctly less marked than was the case two years ago. The other species here mentioned [*macrodentium*, *calligyrum* and *refringens*] possess no remarkable features, and they apparently remain unmodified in their characteristics, none of them being odor-producing."

T. pallidum and *T. pertenue* are parasitic organisms as contrasted with *T. microdentium* and *T. mucosum* which are considered to be saprophytic, yet all of them undergo alterations of their biological characters in cultures.

A. P.

WELTMANN (Oskar). Die "Vitalfärbung" zum raschen Nachweis der *Spirochaete Obermeieri*. [Intra Vitam Staining for Rapid Demonstration of *S. recurrentis*.]—*Wien. Klin. Woch.* 1915. Nov. 18. Vol. 28. No. 46. p. 1257.

The author gives a short account of various methods for staining *Spirochaeta recurrentis* (*obermeieri*) intra vitam, some of such methods being well-known. He mentions LEPORSKY's method, by the use of a mixture of brilliant-cresyl-blue and Sudan III, and his own method. This consists in preparing a thin film of methylene blue or fuchsine-methylene blue on a coverslip, which is then dried over a flame, and the material containing the spirochaetes is spread on the dry coverslip so prepared. [This method is an old one.] A solution of gentian violet in absolute alcohol, used in a similar manner, is recommended for staining the spirochaetes of the mouth.

A. P.

LLOYD (Ll.). **On the Association of Warthog and the Nkufu Tick (*Ornithodoros moubata*).**—*Ann. Trop. Med. & Parasit.* 1915. Dec. 30. Vol. 9. No. 4. pp. 559-560.

The author records the presence of *Ornithodoros moubata* in the burrow of a warthog. A native examining the burrow in the Luangwa valley, Northern Rhodesia, was attacked by these ticks, most of which were very young larvae that had not previously fed. The ticks were found during a search for the pupae of *Glossina morsitans*. It is suggested that the warthog may act as a distributing agent for *Ornithodoros moubata*.

A. P.

YAKIMOFF (W. L.), SCHOKHOR (N. J.) & KOSELKINE (P. M.). **Spirochétose des poules au Turkestan russe.**—*Bull. Soc. Path. Exot.* 1916. Apr. Vol. 9. No. 4. pp. 227-228.

The presence of spirochaetosis in fowls at Tashkent and Termese on the Afghan-Russian frontier was discovered by the present authors in 1913. In July of that year, an epidemic occurred in Tashkent. The adult birds succumbed first, then the chicks were attacked. Out of blood smears from 45 birds, four fowls and four chicks were found infected with spirochaetes. In a second outbreak, two fowls and nine chicks out of 50 birds examined contained spirochaetes in their blood. In an outbreak at Orenbourg among fowls and turkeys, five out of 45 fowls contained blood spirochaetes and five turkeys were also found to be infected. On two other occasions, a cock and two hens, respectively, had numerous spirochaetes in their blood.

At Termese, an epizootic among fowls occurred. Spirochaetosis was suspected, but the birds' blood could not be examined. However, *Argus persicus* collected from farmyards and put on clean birds, have resulted in the production of spirochaetosis. The usual symptoms and post-mortem appearances were shown by the birds at autopsy.

Injections of atoxyl in the pectoral muscles have been successful, the dose being 0.06 to 0.1 gm. for adults, and 0.03 to 0.05 gm. for chicks.

A. P.

WEIL'S DISEASE.

INADA (Ryokichi), IDO (Yutaka), HOKI (Rokuro), KANEKO (Renjiro) & ITO (Hiroshi). **The Etiology, Mode of Infection, and Specific Therapy of Weil's Disease (Spirochaetosis Icterohaemorrhagica).**—*Jl. Experim. Med.* 1916. Mar. Vol. 23. No. 3. pp. 377-402. With 7 plates.

Weil's disease or febrile jaundice is epidemic and endemic in Western Japan. The present authors believe that the spirochaete discovered by them in 1914 and named *Spirochaeta icterohaemorrhagiae* in January 1915 is the pathogenic agent of Weil's disease. The malady is now re-named spirochaetosis icterohaemorrhagica. The symptoms of Weil's disease in Europe and Japan "are similar but there are some variations." *Spirochaeta icterohaemorrhagiae* is present in the blood only during the early stages of the disease and occurs only in small numbers. At autopsy, the liver may contain no spirochaetes or they

may be few or not easily recognised. When the organisms are inoculated to guinea-pigs, they multiply freely and are then more easily detected.

Thirteen out of seventeen guinea-pigs inoculated intraperitoneally with *Spirochaeta icterohaemorrhagiae* gave positive results. The blood of all of the patients on the fourth to fifth day of illness gave positive results; blood from the seventh day was once positive, once negative, once from the ninth day the blood was positive, but none of the three cases tested on the twelfth day gave positive results. Blood must be injected into animals within the first seven days of illness to give positive results. Usually the incubation period is seven to eight days. The passage from guinea-pig to guinea-pig is possible, fifty-one passages having been accomplished by July, 1915. Intraperitoneal, subcutaneous, or oral injection of 2 cc. of heartblood or liver emulsion gave successful results. The animals succumb in five to eight days after intraperitoneal inoculation, in nine to ten days after inoculation through the uninjured skin or the alimentary tract, and in seven to eight days after inoculation through the injured skin. The symptoms in the guinea-pig are like those in man. Rabbits fail to become infected. Some mice and white rats developed jaundice and slight haemorrhage and succumbed, though spirochaetes were not found in them.

The pathological changes in guinea-pigs are described. There is marked general jaundice, with haemorrhages into various parts of the body and parenchymatous changes of the organs. The liver shows cloudy swellings of the parenchyma, the kidneys acute parenchymatous nephritis. "The lungs present small and large hemorrhagic spots, like the wing of a mottled butterfly. This change is one of the most important in the diagnosis of the disease."

The spirochaete is present in the blood and in various organs. It is often seen in epithelial cells. It is most abundant in the liver, where it is common in the intercellular spaces. The adrenal gland and the kidneys are the next most heavily infected organs. Spirochaetes are few in the spleen, bone-marrow and lymphatics.

Spirochaeta icterohaemorrhagiae most commonly are 6μ to 9μ long, the greatest reaching 12μ to 13μ . In the liver short forms measure 4μ to 5μ , but the common forms are longer and measure 8μ to 9μ . The longest individuals average 20μ , though one measuring 25μ has been seen. The thickness is about 0.25μ . Two or three large or four or five smaller waves are present in the body. Under dark-ground illumination some of the spirochaetes show a granular appearance, and granules are present in stained specimens. "According to the length of the spirochaeta the refractive granules number 25 to 30 to 40." The movements of the organisms are shortly described.

Variable results were obtained when the filterability was tested with different filters. Cultures using Noguchi's methods were successful. The mode of infection in nature has not been absolutely proved, but by experiments with guinea-pigs, it has been found that the spirochaete is "able to penetrate through a macroscopically healthy skin and cause the disease." Only a few cases in the authors' clinic indicated cutaneous origin, but a number of suggestions supporting the hypothesis are given.

By examination of the urines of patients and inoculating them to guinea-pigs, it has been found that the spirochaetes are voided with the urine, numerous spirochaetes being present in it about the 13th to 15th day of the illness. One out of ten guinea-pigs inoculated with faeces of patients gave a positive result. The spirochaetes are "excreted in the urine, feces and bile in the experimental disease of the guinea-pig up to the time of death."

An immune body appears during the course of Weil's disease in man, and probably "destroys and dissolves the spirochaetae." The immune body does not seem to be produced in the guinea-pig, and consequently the number of spirochaetes in the guinea-pig is greater than it is in man.

Prophylactic measures are recommended. The disease is frequent among coal miners who work in parts of mines where pumping is necessary. The removal of the water and the disinfection of the ground are necessary. The urine of a patient must be disinfected for at least forty days, since spirochaetes are voided in it for that time. Stools and bloody sputum also should be disinfected.

Treatment with salvarsan usually poisoned the guinea-pig, whose resistance to arsenic is low. Serum reactions gave more promising results. Eleven out of twelve animals inoculated with immune goat serum, before jaundice had appeared, had the spirochaetes disappear from the blood in half an hour after the injection, and all the animals remained alive. The injection of immune goat serum was ineffective after jaundice had appeared. The serum treatment is not suitable for cases of relapse. A partial success has also been obtained with immune horse serum.

Five plates of microphotographs and two of drawings illustrate the article.

A. P.

ITO (Tetsuta) & MATSUZAKI (Haruichiro). **The Pure Cultivation of *Spirochaeta icterohaemorrhagiae* (Inada).**—*Jl. Experim. Med.* 1916. Apr. Vol. 23. No. 4. pp. 557-562. With 2 plates.

The spirochaetes for cultivation were obtained from the heart blood of subinoculated guinea-pigs, the samples of blood being examined under dark-ground illumination. The samples may be used at once or after being kept in a sterile test-tube for several days at room temperature.

Blood agar and blood gelatine were found to be the most satisfactory media of a semi-solid or solid character. Blood gelatine is preferable. The media are inoculated with a drop of infected blood before they become solidified. A layer of paraffin may be added to the surface of the medium in the culture tubes, which are kept at temperatures between 15° C. and 37° C., the optimum being between 20° C. and 25° C. The cultures should be left undisturbed for 10 to 14 days. A growth appears usually in about a week, and the maximum is reached in two to three weeks. There is no odour, no production of gas and no liquefaction of the media.

The morphology and movements of the cultural spirochaetes are briefly described. Their length is said to vary from a "quarter of the diameter of an erythrocyte" to "five times as long." The mode of division was undetermined.

Fluid media may be used for culture. "Blood serum of man or ox diluted with an equal part of distilled water or undiluted ascitic fluid or pleural exudate is sterilized by subjecting it to a temperature of 50° to 60° C. for half an hour for several successive days." Noguchi's medium may also be used. The tubes are incubated at temperatures varying from 15° to 37° C. Growth is first noticed after three to ten days. The authors state that "a pleural exudate rich in fibrin seems to be the most suitable fluid medium for the purpose of cultivating this organism." Small quantities of cultures, inoculated intraperitoneally to guinea-pigs, are pathogenic. The spirochaetes have been recovered from such animals and pure cultures obtained, thus showing that *S. icterohaemorrhagiae* is the causal agent of Weil's disease.

The authors' conclusions are as follows:—

"Pure cultures of the spirochaetal causative agent of the disease known as Weil's disease, or febrile icterus, in Japan, have been obtained by us in a solid, a semi-solid, and a fluid medium. The spirochaeta thus isolated remains pathogenic for guinea-pigs for many generations. Up to the present time we have succeeded through the courtesy of Professor Nagayo, Dr. Komura, and Dr. Ishihara, in cultivating three different strains.

"The spirochaeta is a facultative anaerobe.

"The solid and semi-solid culture media possess one disadvantage, in that they are opaque on account of the addition of red blood corpuscles, but it is hoped that this drawback may soon be overcome by further studies. We shall report later the results of investigations regarding various questions in immunity as well as further details regarding the biological properties of the spirochaeta."

A. P.

UHLENHUTH & FROMME. Zur Aetiologie der sog. Weil'schen Krankheit (ansteckende Gelbsucht).—[The Etiology of Weil's Disease (Infectious Jaundice).] *Berlin. Klin. Woch.* 1916. Mar. 13. Vol. 53. No. 11. pp. 269-273. With 4 figs.

The authors give an account of the symptoms of Weil's disease in man and in subinoculated animals. They found that defibrinated blood at cool summer temperature remained infectious for seven days. The urine of infected men and animals was also infectious. When healthy guinea-pigs were put with infected ones they also became infected, but the exact mode of such infection was not determined. Neosalvarsan, colloidal silver, collargol, colloidal antimony, mercury atoxyl, silver atoxyl, atoxyl, and optochin (MORGENROTH) had no therapeutical effect, apparently when tested on guinea-pigs. It was found that the serum of convalescents contained protective substances, which were also present in the serum of rabbits, sheep and asses.

Certain points of practical importance were noted. Icterus is considered to be the cardinal symptom. The spirochaetes are present in the blood of the patient only on the first day of illness, but appear in greater numbers in subinoculated guinea-pigs. Human urine can also be used for inoculation of animals. A positive result is usual in five days. If the animal is negative for 14 days, the patient can be considered negative for Weil's disease.

Contact seems to be the chief mode of infection. Indirect infection by insects is also possible.

The four microphotographs, illustrating the paper, show spirochaetes in smears or sections of the livers of infected guinea-pigs.

A. P.

GOEBEL. **Beitrage zur Frage der sogenannten Weilschen Krankheit (ansteckende Gelbsucht).**—*Med. Klinik.* 1916. Apr. 9. Vol. 12. No. 15. pp. 381-383.

The author gives a description of the clinical symptoms of two cases of Weil's disease, and remarks on the importance of early inoculation experiments of infected human blood to guinea-pigs. His main conclusions may be summarised as follows: In all doubtful cases of Weil's disease the following procedure of diagnosis by animal experiments should be made. Inoculation of defibrinated blood to guinea-pigs should be performed at the commencement of the illness, and the convalescent serum should be titrated. It was observed that the guinea-pig virus was infective to man. Also, when blood from men suffering from Weil's disease without icterus was inoculated to guinea-pigs, the latter showed spirochaetosis with icterus.

The injured skin of the hands probably serves to admit the virus. The spirochaetes may also enter the body by way of unbroken skin (nail grooves ?) or by the mucous membrane of the eyes. Observations on cases of spontaneous infection show that transmission by insects or per os are also possible. As with *Spirochaeta recurrentis*, great care must be taken in laboratory work with Weil's disease, and rubber gloves should be used.

A. P.

TYPHUS.

Low (R. Bruce). **The Epidemiology of Typhus exanthematicus in Recent Years.**—*Forty-Fourth Ann. Rep. of the Local Govt. Board.* 1914–1915. Supplement containing the Report of the Medical Officer. 1916. London. pp. 28–89.

This account of the epidemiology of typhus was prepared as there were signs of typhus becoming epidemic in central Europe, as a result of abnormal conditions due to the war, and as in certain war areas, notably Poland and Galicia, typhus is endemic. The means whereby the transmission of typhus by lice were fully established are set forth. Preventive measures must be directed against lice; other biting insects may aid in transmission. It is possible that "droplet infection, as in pneumonic plague," may also occur. History shows that typhus occurs under conditions of overcrowding and filth, and it is an "almost invariable accompaniment of protracted military campaigns," where facilities for personal cleanliness for soldiers are scarce, and infestation with lice occurs. The Napoleonic, Crimean, Russo-Turkish and recent Balkan wars have all been accompanied by typhus. In 1915 typhus appeared in Germany among Russian prisoners of war. It also occurred in Austria, and became epidemic among the Turkish troops in the Erzeroum district. The possibilities of outbreaks of typhus on the Western front, owing to the importation of native troops from endemic centres in North Africa, are indicated. In the Western hemisphere, Mexico is the chief focus of typhus. Ireland still remains an endemic centre. In England and Wales during the period 1869–1883 there were 23,702 deaths from typhus, during 1884–1898 there were 2,249, while during 1899–1913 there were only 390. The disease still lingers in the northern counties of England.

An interesting survey of the various epidemics of typhus which have occurred during the last century in the different countries of Europe, Asia, North Africa and America is given.

A. Porter.

CALDWELL (Bert. W.). **The Epidemic of Typhus Exanthematicus in the Balkans and in the Prison Camps of Europe.**—*Jl. Amer. Med. Assoc.* 1916. Jan. 29. Vol. 66. No. 5. pp. 326–331.

This very well written paper deals with the conditions that led to such great mortality in the Serbian epidemic of typhus from December 1914 to July, 1915, and with its relative prevention in the various prison camps that the author saw. The spread of the epidemic from the Danube to the Greek frontier is considered to have been due to preventable causes, to indifference on the part of the civil and military authorities, and to great carelessness. No reliable statistics as to the number of persons infected are available, the military returns not including the civil population, while in many cases death occurred before diagnosis or without medical attention. The author estimates that about one-fifth of the population of two and a half millions was attacked by typhus, and 135,000 (including 30,000 Austrian prisoners) died of the disease. The hospital mortality ranged from 19 to 65 per cent. The opinion of the author is that typhus is solely transmitted "through the bite of an infected louse."

The incubation period is about 14 days. "Eruption follows the onset closely, and reaches its maximum intensity on the fifth day. It is during this five-day eruptive period that the presence of the infected louse becomes dangerous to the non-immune; after this period of the disease and during the convalescence, there is little or no danger of the louse becoming infected after feeding on the patient."

It was noted that more men were infected than women and that children were seldom attacked. "Only where the conditions for hygienic living were provided did the Serbian people escape. All classes and professions were affected." Sporadic cases from the north of Serbia served as foci of infection. The distribution of Austrian prisoners, who were vermin-infested, spread the disease to central and southern Serbia. The unwise scattering of typhus patients also disseminated the malady and made the epidemic uncontrollable.

For the purpose of coping with the epidemic, the country was divided into four sections. The northern and eastern districts were assigned to the French and Russians respectively, the central area was assigned to the English, and the southern to the American Red Cross Sanitary Commission. The last named area included the towns of Uskub, Veles, Prizien, Pristina and Monastir. In each area general sanitation and hygiene were insisted upon, and conditions rapidly improved. On each of the frontiers energetic measures were taken to prevent the spread of the disease into the surrounding countries.

The author considers that the measures taken for the prevention of typhus among prisoners in central Europe were satisfactory. The use of quarantine, the thorough disinfection of clothes and the eradication of lice served to prevent epidemics.

Other diseases communicated by flies and other insects in Serbia are noted. Among such are malaria, typhoid, relapsing fever and pappataci fever.

The treatment of typhus is unsatisfactory. The use of the serum prepared by NICOLLE or the PLOTZ vaccine tends to cause an abortion of the disease. It is noted that with one exception, out of two to three hundred persons inoculated with the Plotz vaccine, all of whom spent some time in the typhus areas, no case of infection occurred.

A. P.

MUELLER (O.). *Ueber Fleckfieber.*—*Med. Klinik.* 1915. Nov. 7. Vol. 11. No. 45. pp. 1230-1233; Nov. 14. No. 46. pp. 1261-1264. With 4 text-figs; Nov. 21. No. 47. pp. 1285-1287.

This paper gives an account of the author's experience of typhus epidemics in prison camps in North Germany. The mortality varied with the age of the patients, the younger men being more resistant than older ones. Remarks are made on the means adopted by different workers for combating outbreaks. The use of mixtures containing various sulphur compounds, of naphthalene-vaseline, eucalyptus, fennel oil, aniseed oil, bergamot, rape oil, and of xylol and tobacco water as preventives are discussed. They may be somewhat efficacious against lice, but are of little use against nits. Louse transmission is considered the most common means of spreading typhus. The author thinks that typhus is probably only a septic variety of typhoid.

A discussion of the pathological anatomy, clinical manifestations with complications such as symmetrical gangrene of the feet, and a

number of variations of the temperature curves observed, is given. The prognosis varies with the condition of nourishment, nature of the disease, general constitution and age of the patient. A differential diagnosis of typhus from paratyphoid A and B, typhoid, measles and small-pox is given, and notes on the treatment adopted by the author and previous workers are set forth. [There does not appear to be anything new in these differential diagnoses and treatments.]

A. P.

SPAET (Wilhelm). **Zur Frage des Flecktyphus auf dem galizischen Kriegsschauplatze.** [Typhus in the Galician Battle-Field.]—*Wien. Klin. Woch.* 1915. Dec. 9. No. 49. pp. 1348-1351.

The author has investigated an outbreak of typhus among the civil population in a small endemic centre in Galicia. Out of 55 cases observed, 44 gave a positive Widal reaction. The epidemic, though described as typhus, is therefore considered really to be one of typhoid, and it is suggested that many other cases termed typhus have really been typhoid. The author largely bases his conclusions on the hypothesis that the Widal reaction is absolute and is invariably reliable. He states that clinically no one symptom is absolutely restricted to typhus or typhoid and is entirely absent from the other malady. Abnormal temperature curves may be obtained in each case. He concludes that such outbreaks must be overcome on a large scale by the methods appropriate for typhoid, that is, by adequate disinfection of excreta, rather than by measures for the removal of lice.

A. P.

DELÉARDE & D'HALLUIN. **A propos d'une épidémie de typhus exanthématique observée en Allemagne (d'avril à juin 1915).**—*Bull. et Mém. Soc. Méd. des Hôpit. de Paris.* 1916. Mar. 23. 3 ser. 32 Ann. pp. 320-328.

The authors, when prisoners of war in Germany, were able to aid in combating an epidemic of typhus at the prison camp at Langensalza in Saxony and in another at Niederzwehren near Cassel in the Grand Duchy of Hesse. The epidemic commenced after Russian prisoners were mixed with the French. It began in January 1915, and spread till May at Langensalza and till July at Niederzwehren. In April and May there were 5,000 men ill simultaneously at the latter camp. Conditions at this camp were very harsh. No isolation measures were taken until May, and many deaths occurred. Lice undoubtedly spread the disease, but in some cases droplets of saliva expelled in coughing were infectious, and when inoculated to the mucosa produced the disease. The appalling conditions prevailing at the camps are set forth in detail.

It was found that the incubation period varied according to the mode of infection, the number of louse bites, the virulence of the causal agent and the state of receptivity of the person inoculated.

A detailed account is given of the various symptoms observed, and of the complications, a new one being noted—arteritis, which passes easily into dry gangrene. The other complications are well known. It is mentioned that for 15 days after the cure of typhus, spots or marks can be found here and there on the body.

A. P.

NEUKIRCH (P.) & ZLOCISTI (Th.). **Epidemiologische und klinische Erfahrungen bei Fleckfieber in Ostanatolien.** [Typhus in East Anatolia.]—*Med. Klinik.* 1916. Mar. 5. Vol. 12. No. 10. pp. 256-259.

The authors give an account of an epidemic of typhus observed in East Anatolia. The long discussion of the clinical manifestations and of temperature curves covers the same ground as that of most other workers and contains nothing new. The belief is expressed that typhus is really a malady of the brain, and that prognosis depends largely on the condition of the brain, especially of the medulla oblongata. Notes on various complications are briefly given. The main transmitting agent of typhus is considered to be the louse, but the flea and the bug cannot be entirely excluded as they were exceedingly abundant in the typhus hospitals.

A. P.

SALAZAR (Manuel Martin). **Profilaxis del Tifus exantematico.**—*Siglo Med.* 1916. Mar. 11. Vol. 63. No. 3248. pp. 161-163; Mar. 18. No. 3249. pp. 177-179; Mar. 25. No. 3250. pp. 194-196; Apr. 1. No. 3251. pp. 209-213; Apr. 8. No. 3252. pp. 225-229.

This interesting general account of typhus by Dr. Salazar, who is Director-General of Exterior Sanitation in Madrid, is worthy of being read in the original by those interested in the subject. The main outlines of the articles only can be mentioned here. The first part of the work consists of a general history of outbreaks of war-diseases, especially of typhus and cholera. Epidemics were formerly thought to be spread by gipsies, beggars, pilgrims and other wanderers, but were spread in reality by their ectoparasites. With regard to typhus, Dr. C. M. CORTEZO, at the International Sanitary Conference at Paris in 1903, set forward the hypothesis of typhus being lice-borne (see p. 343 of the Abstracts of the Proceedings of the Conference), based on his experiences of an epidemic in Madrid. The work of NICOLLE, CONSEIL, RICKETTS, and others came later. It is stated that CORTEZO told his ideas also to ROUX, the Director of the Institut Pasteur of Paris, at whose instigation, it is claimed, NICOLLE and CONSEIL undertook work at Tunis, their first report appearing in 1909.

A good account is given of the characters of typhus epidemics and of the predisposing causes. The views as to a protozoal excitant, a bacterial one and a filterable virus are also discussed. The work of RABINOWITCH, of NICOLLE and CONSEIL in Tunis, of CORTES in Mexico, of RICKETTS and WILDER, ANDERSON and GOLDBERGER in America, and of HORT and INGRAM at the Lister Institute, London, who worked on material from the epidemic in Belfast in 1914, are all treated at length. The organism found resembled that of RABINOWITCH, WILSON and PLOTZ, and was very small, 0.2μ to 0.6μ , and was filterable. The excitant of typhus is probably a very polymorphic micro-organism.

With regard to the mode of transmission, both the body louse and the head louse are incriminated. Inoculation may take place by the bite of the insect or by the crushing of the insect on the skin. Experimental work with insects other than lice so far has been negative. Prophylaxis, therefore, must be directed against lice infesting the

person, the ingress of lice-infested persons into typhus areas must be prevented, and typhus cases must be segregated. There is need for increased attention to sanitary procedures in Spain, and general warnings as to anti-typhus measures, disinfection of clothing, the use of preparations such as ointments against lice, are given. There are also short accounts of the diagnosis of typhus, and of its differential diagnosis, and a summary of general hygienic measures recommended concludes the paper.

A. P.

ANCONA (Giacomo). *Sulla diagnosi differenziale fra tifo addominale e tifo esantematico.*—*Riv. Crit. Clin. Med.* 1916. Mar. 4. Vol. 17. No. 10. pp. 149-154. With 1 chart.

The author wishes to draw attention to atypical cases of typhoid, which may prove to be typhus. He gives a detailed account of a soldier patient, aged 23, admitted to an Italian field hospital, and considered to be suffering from typhoid. The man had been inoculated against typhoid and cholera. Five days after admission to hospital, Widal's reaction was positive. A rash developed, the spots disappeared on pressure and were non-haemorrhagic. Delirious periods occurred. The patient died on the eleventh day. At post-mortem, the lesions associated with typhus were found. The author remarks on the great difficulty of differentiating between some forms of typhus and typhoid, especially as Widal's reaction may persist for a long time after preventive inoculation. The early symptoms of both diseases may be similar. The violent mental disturbances, increase in the volume of the spleen, rapidity of appearance and distribution of the rash are not absolute criteria for differentiation, though helpful. The abdominal symptoms and sharp changes in the temperature curves need attention. A knowledge of the epidemiology of typhus is of use at times in reaching a correct diagnosis.

A. P.

POINDECKER (Hans). *Zur Diagnose des Fleckfiebers im Felde.*—*München. Med. Woch.* 1916. Feb. 1. Vol. 63. No. 5. pp. 176-177. With 3 figs.

In order to diagnose typhus, use is made of the results of the histological examination of a small portion of the rash. The piece of skin is removed and embedded, sections being stained with haemalum and carbol fuchsin. In typhoid the vessels of the corium, especially of the papillary bodies, show perivascular infiltration with lymphocytes. Necrosis of the walls of the bloodvessels is not seen. The roseola of typhus, however, show a clear necrosis of the vessel walls, more especially of the precapillaries and the smaller arteries of the papillae. Granular and hyaline thrombi may be present. Perivascular infiltration occurs. The greater part of the infiltration elements consists of large cells, not unlike epithelia, possessing large, pale longish nuclei. Other nuclear bodies may lie in the granular stroma. Photographs of sections illustrating the above points are given.

A. P.

WEIL (E.) & FELIX (A.). **Zur serologischen Diagnose des Fleckfiebers.**—*Wien. Klin. Woch.* 1916. Jan. 13. Vol. 29. No. 2. pp. 33-35.

The results described by the author were based on examinations of cases of typhus from Eastern Galicia. Paratyphoid, typhoid and some dysentery cases were also examined. In the case of typhus, a constant relation between the specific agglutination and the Widal reaction could not be established. In experiments made with control sera, 12 per cent. of 169 cases investigated gave normal agglutination. A bacillus was found in an acute case, and possibly might be the excitant of typhus. It was very difficult to find. If this organism is the causal agent, a further aid in the diagnosis of typhus will be afforded.

A. P.

HABETIN (Paul). **Zur Differentialdiagnose zwischen Typhus exanthematicus und abdominalis.**—*Wien. Klin. Woch.* 1916. Jan. 13. Vol. 29. No. 2. pp. 35-37. With 3 curves.

A discussion of the chief differences between typhus and typhoid fever is presented by the author. According to his observations, the temperature curve of typhus is characteristic, being almost geometrically congruent, with a definite, spontaneous, critical fall, which does not occur in typhoid. Serological tests are valuable indications of typhoid. However, it is pointed out that mixed infections may occur, as well as atypical ones, for which no definite rules can be made.

A. P.

JOB (E.) & BALLET (B.). **Les complications nerveuses du Typhus exanthématique.**—*Bull. et Mém. Soc. Méd. des Hôpît. de Paris.* 1915. Dec. 30. 3 ser. 31 Ann. No. 39-40. pp. 1258-1267.

The authors have observed 340 cases of typhus in two years at Casablanca, and have noted the nervous effects of the disease. Three sets of nervous complications are set forth: (i) those showing the action of the virus on the brain, (ii) those showing the action on the spinal cord, and (iii) those giving evidence of the effect on the peripheral nerves. Some cases illustrative of each of these complications are given in detail. Death is said to be due, not to the brain effects, but to cardiac insufficiency. In fatal cases, circulatory troubles as well as excitement, delirium, or coma are of nervous origin. Convulsive periods occur in severe cases. Paralysis of the intestine and laryngo-typhus, when intense, presage death. The nerve centres and the pia mater of typhus cases are always congested. Where careful histological examination was made, great congestion of the blood vessels of the pia mater and of the grey matter occurred. Similar lesions occurred in the spinal cord. Clear lesions of the nerve cells were not found in the brain or spinal cord. Congestive lesions were localised mainly in the viscera. Serous meningitis may occur. The localisation of nervous complications in the peripheral nervous system is difficult of explanation.

A. P.

WIENER. **Ueber Flecktyphus.**—*Wien. Klin. Woch.* 1916. Jan. 27. Vol. 29. No. 24. pp. 117–119. With 4 figs and 4 charts.

The author gives some of the results that he has obtained on typhus in the infectious diseases hospital at Vinkovci. He points out the uncertainty of the Widal reaction, and notes that in typhus the brittleness of the bloodvessels is very characteristic. The presence of submucous blood extravasation in the intestinal tract in cases of mixed infections is also mentioned. An account of four such cases, with figures of the rashes and the temperature charts, is given. Combating of heart weakness is essential. Caffein injections five or six times daily, ice bags applied to the heart, injections of ergotin or adrenalin if severe bleeding, and very warm baths daily at convalescence are recommended.

A. P.

NICOLLE (Ch.) & BLAIZOT (Ludovici). **Sur la préparation d'un sérum antiexanthématique expérimental et ses premières applications au traitement du typhus de l'homme.**—*C. R. Acad. Sci.* 1916. Apr. 3. Vol. 162. No. 14. pp. 525–528.

The blood serum of typhus convalescents and of animals recovered from experimental infection has preventive properties from the sixth to the tenth day of defervescence, when used for inoculation.

It is difficult to prepare anti-typhus serum, since cultures of the causal agent are unknown. The virus itself has to be used. The conservation of the virus in all the organs of guinea-pigs renders the preparation of sera possible. Immunisation of large mammals, such as horses and asses, by inoculation of emulsions of the spleen and suprarenal capsules of infected guinea-pigs, has been successfully accomplished. Details of the immunisation experiments are given.

The serum of the ass has been used on infected guinea-pigs. Owing to its mode of preparation, it is highly toxic to guinea-pigs in doses greater than 1 cc. It is better to subdivide the dose and to inoculate 0.25 cc. in one day. The action of the serum against the virus is then efficacious.

In the monkey and guinea-pig the simultaneous inoculation of the virus intraperitoneally and of the serum subcutaneously results in no rise of temperature, controls inoculated with the virus alone contracting typhus. The curative power was tested on guinea-pigs alone. If inoculated during the incubation period or at the rise of temperature, the serum stops the development of infection. Inoculated on the first or second days, it stops it rapidly; inoculated later, its action is slow, doubtful or none. The animal in which infection was prevented by precocious inoculation of serum showed no immunity later, so proving the destruction of the virus by the anti-body in the serum.

The action of the anti-typhus serum has been tested on 19 human patients. Five were Tunisians, eleven were French and three were Serbs, all being seriously ill. Ass serum was used exclusively. All the cases were cured rapidly when the serum was used early, but more slowly when the serum was not used till after several days of illness. Defervescence occurred in 24 to 28 hours. In each case, the temperature fell at each inoculation of serum. The pulse and kidneys quickly improved. Nervous symptoms were not influenced so rapidly, but

improved with repeated inoculations. In one hospital 14 patients were cured by serum-inoculation, while two who were not inoculated died. The serum has no toxic action on man, but as a precaution has only been used in weak doses of 10 cc. per day as a maximum. The results seem favourable to serotherapy applied to typhus.

A. P.

RABINOWITSCH (Marcus). **Объ экспериментальномъ сыпномъ тифѣ у морскихъ свинокъ и вакцинаціи противъ него.** [Le typhus exanthématique expérimental du cobaye et la vaccination contre lui.]* 47 pp. 1915.

The author has previously published a number of papers on *Diplococcus exanthematicus* [see e.g., this *Bulletin*, Vol. 2. p. 642]. Various animals inoculated with the blood of patients or with pure cultures obtained from them have contracted typhus, but the guinea-pig was the only animal in which the temperature curve typical of typhus was reproduced. It was therefore selected for further experimental work.

The bacillus, in pure young cultures, had the form of a rod, staining at its extremities with even dilute aniline stains. For cultures, three to five cc. of infected blood was sown on 100 cc. of bouillon-ascitic fluid. For inoculation, five to six cc. of blood mixed with two cc. of a one per cent. solution of sodium citrate was used. This quantity was sufficient for two guinea-pigs. Control guinea-pigs were inoculated with pure blood, three to seven cc. being sufficient for two.

In other experiments, 27 hour cultures on solid media were emulsified and injected intraperitoneally. They killed the guinea-pigs in periods varying from some hours to a day. Only very virulent cultures were inoculated subcutaneously. A table of the results of the experiments is given.

The author gives a full summary, which may be translated thus:—

1. The blood of patients taken at the crisis and cultures of the diplococcus obtained from its culture are virulent for guinea-pigs in the majority of cases. Intraperitoneal inoculation produces attacks in them like typhus in man.

2. The period of incubation, the attack and prognosis of the malady in the guinea-pig corresponds to the virulence and quantity of bacilli inoculated, as well as to the mode of introduction and peculiarities of the animal.

3. The attack may last from one to twenty-eight days, and commences after an incubation period of from nine hours to thirty-seven days.

4. The gravity of the malady in the guinea-pig depends on the severity of the malady in the man from whom the inoculation material was obtained. In some cases, the malady in the guinea-pig may be benign though the virus was virulent, while the reverse has also been observed.

5. The virulence of the blood and of the bacilli obtained by its culture diminishes towards the crisis and sometimes even disappears.

6. In fatal cases the virulence increases steadily as death approaches.

* Translated from a summary in French made by Dr. KEILIN.

7. The serum obtained by decantation, which is as virulent as the blood itself, and blood cultures of the cardiac blood of guinea-pigs taken at the moment of paroxysm, give colonies of the *Diplobacilli*.

8. The serum passed through a Berkefeld filter has no action on guinea-pigs, and cultures of it are sterile.

9. The blood of guinea-pigs taken at the moment of paroxysm is virulent for clean guinea-pigs. Cultures of it give the *Diplobacillus*, even in cases where the blood of the patient originally used does not give the organism on culture.

10. The influence of passage through animals on the virulence of the cultures depends on their original virulence, on the length of the stay in the animals and on special circumstances. As a rule, numerous passages increase the virulence of the infective agent.

11. Passage through the body of a child, who is refractory to infection, diminishes the virulence of the pathogenic agent and its power of multiplying on culture media.

12. The reverse is seen in young guinea-pigs, which are more susceptible to infection than the old ones.

13. The diminution of the virulence of the pathogenic agent in cultures commences from the second week after a pure culture has been obtained. After three to five weeks, with numerous transplantings, the virulence entirely disappears.

14. Guinea-pigs do not react to massive doses of weak cultures. If inoculated afterwards with virulent cultures, they show the symptoms of typical typhus.

15. Guinea-pigs that have had the disease become immune and retain their immunity for a long time, up to 421 days being known.

16. Guinea-pigs inoculated with virulent cultures warmed to 60° for half an hour become refractory to new infections. They have kept their immunity up to 208 days.

The author concludes that the pathogenic agent of typhus is the bacillus discovered by him in 1909, which is named *Diplobacillus exanthematicus*.
A. P.

PAPAMARKU. *Beiträge zur Serodagnostik des Fleckfiebers.—Cent. f. Bakt. 1. Abt. Orig. 1915. Nov. 29. Vol. 77. No. 2. pp. 186–197. With 2 charts.*

After reviewing briefly the work of a number of previous investigators on complement fixation in typhus and syphilis, the author gives an account of his recent results in cases of typhus. He used alcoholic extract of the organs, 1 gram of organ substance in 10 cc. of alcohol. Both the sera of typhus patients and of convalescents therefrom were tested, and the results obtained are set forth in a series of tables. The main points elucidated were the following :—The complement fixation reaction with alcoholic organ extract as antigen gave positive results in a large percentage of sick and convalescent cases, if fresh, active sera were used. When inactive sera were employed the positive reactions were very few. The greatest number of positive results, using active sera, were obtained in the patients in the second week of the disease, and in patients in the third week if inactive sera were used. Positive results also occurred in convalescents after five weeks' illness. The reaction is considered to form a basis for differential diagnosis between typhus and typhoid in cases where a rash is not present.
A. P.

DELTA (Constantin). Sur la réaction de Wassermann dans le typhus exanthématique.—*Cent. f. Bakt.* 1. Abt. Orig. 1915. May 14. Vol. 76. No. 1. pp. 50-54.

The author gives a brief, historical account of the attempts made by previous workers to utilise the Wassermann reaction in the case of typhus. During an epidemic of typhus at Alexandria that commenced in January 1914, the author applied the Wassermann reaction in 42 typical cases of typhus. In 19 cases, the test was made during the febrile period and seven of these were positive. The positive results were obtained some days before defervescence. The negative results were in cases tested before the fall of temperature, and were repeated after defervescence and then found positive. Six cases tested on the eve of defervescence gave positive reactions. Thirteen cases could only be tested after the fall of temperature and the reaction was positive in 12 of them. Four patients tested after complete cure also gave positive reactions. The history of some of the cases is given. When the typhus antigen was employed in two cases of pneumonia, four of typhoid, two of mumps, two of variola, and one of acute miliary tubercle, the results were constantly negative. Thus, out of 42 clinically definite cases, the Wassermann reaction was positive in 40. While the reaction was negative at the commencement of the malady, it became almost always positive towards defervescence, and once more became negative after a time that did not appear to be very long (two months perhaps as a maximum). It is hoped that the Wassermann reaction results thus recorded may be of service in the determination of doubtful cases, especially at the beginning and end of an epidemic.

A. P

OLITSKY (Peter K.), DENZER (Bernard S.) & HUSK (Carlos E.). The Etiology of Typhus Fever in Mexico (Tabardillo). Preliminary Communication.—*Jl. Amer. Med. Assoc.* 1916. May 27. Vol. 66. No. 22. pp. 1692-1693.

The work of the authors was begun in February, 1916, at Matchuala, Mexico, but was interrupted in March. Studies on the blood of typhus patients were undertaken in order to ascertain whether a causal organism occurred therein. Three blood cultures were made in a medium containing 0.5 per cent. of glucose, and an organism was recovered in one case. Cultures were also made from the blood of 28 cases, the medium containing 2 per cent. of glucose. Only eight of these cultures could be observed for a sufficiently long time and in all of them the same organism was found.

The organism was an obligate anaerobic, Gram-positive bacillus, identical with *Bacillus typhi-exanthematici*. Cultures of this were pathogenic to guinea-pigs.

In cultures made from lice removed from the clothing of typhus patients, the same organism was found. Infected lice inoculated into guinea-pigs produced febrile reactions, and splenic lesions were found at autopsy. The bacillus was recovered from spleen cultures.

A. P.

- BERTARELLI (E.). i. **La Lotta contro il tifo esantematico.**—*Morgagni*. 1915. Apr. Pt. 2. Vol. 57. No. 22. pp. 343-348.
 ii. **I punti controversi della epidemiologia del tifo esantematico.**—*Ibid.* July 30. No. 37. pp. 585-591.
 iii. **Gli insegnamenti della lotta profilattica contro il tifo esantematico.**—*Ibid.* 1916. Feb. 15. Vol. 58. Pt. 2. No. 10. pp. 145-156.

i. The author gives a general account of an epidemic of typhus fever. He emphasises that the disease is transmitted by lice. The excitant of typhus has been suspected to be a Protozoön, but the presence of an organism of this nature has not been demonstrated. The excitant of typhus is probably to be found in the red blood corpuscles and not in the plasma. By experiment it has been found that the incubation period of typhus is up to ten weeks. Guinea-pigs are the only laboratory animals which, when infected with typhus, present the same temperature curve as man. Prophylactic measures must be directed in the first instance against lice. By such measures the epidemics of typhus in Tunis were reduced from 856 cases in 1909 to three in 1914, showing the efficacy of preventive measures against lice in combating typhus.

ii. This paper gives an account of the various controversies relating to typhus fever and more especially to its mode of transmission. In the opinion of the author there is no doubt that the louse is the most common transmitter of typhus. Transmission by the louse is easy and has also been proved. Other ectoparasites may aid in the conveyance of the disease to man. Cases of infection by the inhalation of droplets of sputum of sufferers or by contact with them are possible, but do not account for rapid spread of epidemics. The work of recent investigators is quoted in support of the louse-borne nature of typhus.

iii. This paper contains a useful summary of the prophylactic measures adopted in different countries against lice. The author again states his opinion that lice are the most important source of the spread of typhus. Though the inhaling of infected saliva has been inculpated by some as a means of contracting infection, he thinks it is at any rate very secondary. In combating epidemics of typhus, attention should be concentrated on the eradication of lice, and for prudence sake, prophylactic measures should be instituted against all biting insects. Both France and Germany have adopted prophylactic measures against lice. In Germany sulphur dioxide and "salforkose" have been used. Salforkose contains 90 per cent. carbon disulphide, 10 per cent. water, alcohol, a little formaldehyde and mustard oil. A mixture of 90 per cent. carbon disulphide, 5 per cent. water and 5 per cent. alcohol also can be used. Lice on the body can be destroyed by mercurial ointment. Since March 1915, the Italian authorities have used the following mixture for the destruction of head and pubic lice:—100 parts of petrol, 50 parts of olive oil and 10 parts of Balsam of Peru. As a preventive of lice, the following mixture is useful:—Oil of aniseed or oil of fennel 30 to 40 parts, alcohol (96 per cent.) 40 to 60 parts. Powder containing 5 per cent. cresol or naphthalene in sachets worn on the body has been of service to the troops.

In March 1915, the Austrian army orders recommended naphthalene in body sachets and the use of a mixture containing 30 to 40 parts of oil of aniseed, with or without bergamot, for freeing the skin from lice. Petrol is of use as it prevents the breeding of lice.

Exposure to compressed steam destroys both the lice and their ova in clothing. The addition of 8 per cent. solution of sulphur dioxide to clothes and body linen is sufficient to kill lice and their ova. A solution of hyposulphite of soda mixed with tartaric acid can be used. Three to five per cent. solution of ammonia can be used on the skin, but will not kill ova. Ten per cent. formalin kills lice rapidly, but it is doubtful if it kills the ova. Acetic acid, sprinkled or rubbed on the body, is useful for destroying lice, and is better if one per cent. corrosive sublimate is added, but is irritating to the skin. Phenol and creolin (5 to 10 per cent. solutions) have also been used and serve moderately well in keeping lice from the skin. Some Austrians consider oil of aniseed good, but opinions differ as to the value of xylol, camphor and creosote.

Benzine merits mention. Its inflammability and somewhat slow action are disadvantages, but its portability, simplicity of application, harmlessness and efficacy (not high but sufficient) commend it. Simple spraying of the body and clothes is not so good as impregnation with benzine vapour. Benzine has been largely used in France. Powdered borax has some effect, but is of little use against lice. Camphor is of some use, either as oil, or in alcohol, or as pomade or powdered. It may serve as a preventive. Chloroform has been recommended as a preventive in Italy and Germany.

Essence of mint may be of use, as it not only kills lice with which it comes in contact, but its odour repels them. It can be used as such, in alcohol, in oil or with lanoline. It irritates the skin when used as essence or concentrated, and the treatment has to be repeated if the ova are to be destroyed. The same is true of pepper and menthol. Mercury in various forms is of use against pubic lice only.

The author mentions various mixtures containing naphthalene, but doubts their efficacy for the destruction of the ova of lice. In war, powders are superior to lotions and pomades. In short, the author advises that lice should be got rid of by any means available.

A. P.

PRIETO. Un Dato para la etiología del tifus exantemático.—*Siglo Med.*

1916. Jan. 8. Vol. 63. No. 3239, pp. 19-20.

The author points out that at the International Sanitary Conference held in Paris during November and December 1903, the first statement that typhus fever was transmitted by lice and by fleas was made by Dr. CORTEZO. The present author quotes the extract containing this statement—made in 1903—from the official records of the Conference. Dr. CORTEZO, who was director of sanitation, made his observations on an outbreak of typhus near Madrid and on the preventive measures taken therein.

A. P.

BOOK REVIEW.

HOWARD (Leland O.), DYAR (Harrison G.) & KNAB (Frederick). **Th Mosquitoes of North and Central America and the West Indies. Vol. 1. A General Consideration of Mosquitoes, their Habits, and their Relations to the Human Species.**—vii + 520 pp. 1912. **Vol. 2. Plates** [150 comprising 713 figs]. 1912. **Vol. 3. Systematic Description** (In two parts). **Part 1.**—vi + 523 pp. 1915.—Washington: Carnegie Institute. [Price \$10.]

Once again, if it be lawful to compare small things with great, the New World has been called in to redress the balance of the Old, for in this full and ripe treatise upon American Culicidae the taxonomic controversies that have disturbed the Culicologists of Europe, since mosquitoes became notorious as extensive carriers of disease, may be expected to find concordance and a settlement, to the advancement of general knowledge, and to the relief and comfort of those whose business with mosquitoes is limited to the comparatively few species that are of serious pathogenic importance to man.

Of the four volumes composing this monumental memoir only three have been published, the fourth, which is to contain among other things the systematic account of the genus *Anopheles*, being still to come. Of the three volumes published the first is of general interest and treats of the structure and natural relations of mosquitoes as insects, as well as of their bearings upon human affairs as disseminators of certain prevalent diseases; the second consists of plates of illustrations, while the third contains a large instalment of the descriptions of American species, and the general taxonomy of the family.

The Introduction to the first volume explains how the work was begun and continued, financially and otherwise. It states with some emphasis that although begotten of medical discoveries and sanitary needs, it is strictly an entomological monograph, which is true enough as regards the first 185 pages, but in respect of the residual 300 pages the definition errs on the side of modesty, since entomology there plays rather the part of chorus in the great tragic dramas of malaria and yellow fever.

In the purely entomological chapters the *Culicidae* are subjected to a scrutiny, close, punctilious, and comprehensive, in every stage of their structure—egg, larva, pupa, and adult—and in their habits, physiological needs, seasonal vicissitudes, and other natural relations in each stage. Apart from its value on the anatomical and biological side, the information here amassed is rich in interest for the sanitarian, particularly in its fulness and definiteness of statement in matters like specific longevity, seasonal prevalence, specific peculiarities in breeding-places, manner of hibernation and aestivation, etc., where exact knowledge is essential to rational and successful sanitary endeavour. The natural enemies of mosquitoes and mosquito-larvae are treated at great length and in full detail, though the authors appear to be of opinion that the only enemies that can be made practically useful are fish.

Mosquitoes in relation to malaria occupies more than fifty pages, some of which are devoted to an account—contributed by Dr. A. NEIVA—of the malaria parasites, and to a historical review of the origin, growth, and scientific demonstration of the mosquito-malaria theory. The geographical distribution of malaria is also considered, and a discussion of the unforeseen effects of civilisation shows on the one hand how malaria has disappeared from lands reclaimed by drainage, and on the other hand how certain tracts reclaimed by irrigation have become intensely malarious. The *Anopheles* mosquitoes are treated with the utmost fulness, in their habits and modes of life, hibernation and aestivation, powers of flight, colour sense, breeding places, larval habits, etc. Among unusual breeding places mention is made of the water that collects in holes in trees, the site habitually chosen by *Anopheles barberi* (now considered by CHRISTOPHERS to be synonymous with *A. nigripes* and *A. plumbeus*) and by *A. eiseni*; also of LUTZ's discovery of the larvae of *A. cruzii* in epiphytic Bromeliaceae of mountain jungles in Brazil.

"*Aedes calopus*" (as the authors prefer to call *Stegomyia fasciata*) and yellow fever fills more than sixty pages, initiated by a very full account of the origin, proof, and several confirmations of the *Stegomyia* theory, a full description of the experiments and conclusions of MARCHOUX and SIMOND regarding the possible transmission of the virus by the infected mosquito to its progeny, and reviews of several outbreaks of yellow fever where the efficacy of measures for exterminating or abating *Stegomyia* was actually demonstrated. The account of the insect itself could not be more complete. Its idiosyncrasies, as well as its habits, are noticed at length. Though thoroughly diurnal it will occasionally bite at night, in a well-lit room. It is so intimately domestic that it prefers human company, and may be packed up with clothes in baggage. Though it will live on sugar it will not ripen its eggs unless it have blood. Though its eggs resist experimental freezing they cannot endure a prolonged low temperature. Nothing is too profane or holy for its brood, from a broken bottle to a font or a piscina. Though it usually deposits its eggs in some artificial site, it may occasionally revert to its supposed ancestral habit of using a hole in a tree. Though the larvae may develop—possibly by resort to cannibalism—in water that is perfectly clean and sweet, they seem to prefer water with a slight taint of sewage, and to be able to stand brackish water, and even—if they have almost reached the pupal stage—a mixture which is half sea-water. Some observers state that soapy water is fatal to the larvae, while others have found the larvae thriving in water brackish with wood-ashes. PERYASSU's experiments, showing that larvae removed from water and kept upon moist ground for 13 days duly completed their growth and development on being returned to their native element, are quoted.

The geographical distribution of *Stegomyia fasciata* (or *Aedes calopus*), its primeval home, and instances illustrating the manner of its spread by ships and railway-carriages, are all discussed at some length. The authors distinguish between temporary distribution and permanent distribution, the latter being the circumtropical zone where no frosts prohibit breeding. Though GORD's speculations are treated to full consideration the authors adhere to the generally accepted opinion that the original home of the insect was the West Indies and the Spanish Main, whence they think it was carried to Europe in the ships of the Spanish Conquistadors.

Fourteen pages are allotted to dengue and filariasis and the mosquitoes concerned in the transmission of these diseases. Here we find the familiar *Culex fatigans* transformed out of all reasonable compass into "*Culex quinquefasciatus*."

Following these sections on Mosquitoes as carriers of specific diseases comes a monody on the economic losses caused by malaria and yellow fever, e.g. through perpetual sickness, lethargy, and predisposition to other ailments, through depopulation of flourishing tracts, through retarding the development of the wilderness, and by impeding human progress generally. If, as Carlyle's Sauerteig asserts, the Hell of the English signifies mainly the terror of failure to make money, the idea at the back of this chapter is very sound. "Reduced value of real estate" is one of the author's texts that, rightly expounded, might have consequences.

In 74 pages the principles and practice of the control of mosquitoes are most attentively and most exhaustively examined. For adult mosquitoes, nets, traps, repellent applications, fumigants, trees and plants credited with deterrent qualities are all discussed with the most assiduous regard. For larvae, drainage and methods of dealing with breeding places, larvicides, and the employment of natural enemies are described and debated with the same fulness and scrupulous attention to detail. Ross's terse summary of the objects of anti-mosquito measures is quoted as it stands, and finally some classical examples of successful operations against disease-carrying mosquitoes, on the large scale, in America, Japan, Algeria, Ismailia, and Italy, are given to point the moral.

Of this admirable first volume, however, this one adversative criticism must be whispered—that outside the purely entomological sections it is sometimes tedious and flat, owing partly to the inclusion of prolix and often irrelevant context in the abounding quotations and partly to a proneness to reiteration, and also that in places it is somewhat diffuse

and disjointed. But whether this is the inevitable consequence of plural authorship, or whether it merely illustrates the argument that :—

“ When workmen strive to do better than well
They do confound their skill,”

it does not diminish the solid value of the book for purposes of reference.

The second volume is composed of plates of illustrations, the 44 plates of larvae, the three plates of eggs, and the three of pupae—all in each case magnified—and the beautiful plate of *Anopheles* wings, being of superlative artistic excellence. Besides these there are 39 plates (268 separate figures) of male genitalia and 58 plates (396 separate figures) illustrating specific features of larvae.

In the third volume Messrs. Dyar and Knab unfold their system, which is distinguished by its sagacity and simplicity. The likenesses and unlikenesses by which the species are sorted and segregated are not seized promiscuously from inspection of the adults alone, but are discreetly sought for through all the independent stages of the insects' existence, and as the authors have a very good eye for deep-seated resemblances, and a very critical discernment in resemblances that are merely adaptive and superficial, and as moreover a large proportion of the material from which their classification is built consists of adults associated with determinate larvae, it is probable that their system comes as near the ascertainable order of nature as can be expected.

They include the *Diridae* with the *Culicidae* and arrange the family thus enlarged in three subfamilies—*Culicinae*, *Corethrinae*, and *Dixinae*. In this course they are in accord with a suggestion of Professor WILLISTON which has already been adopted by Mr. EDWARDS, and approved by others.

The *Culicinae* are next grouped in two divergent series—*Culicini* and *Sabethini*—separated by differences which are manifest in the adult, in the pupa, and in the larva. At first I was rather inclined to cavil at this arrangement, but a larger acquaintance with *Sabethini*, recently acquired, has convinced me that the author's inference, that the difference between *Culex* and *Sabethes* lies deeper down, or further back, than the more specious difference between *Culex* and *Anopheles*, is a sound one. The chief group-characters of the *Sabethini* are as follows :—In the adult : a pair of coarse occipital bristles projecting horizontally forwards between the eyes, together with a wisp of hairs on the after part of what has commonly (though erroneously the authors say) been called the metanotum, and no bristles on the field of the scutum. In the larva : no brush on the mid-ventral line of the 9th abdominal segment, this brush being represented by a pair of lateral hairs or hair-tufts. In the pupa : remarkably small terminal paddles, and remarkably large tufts at the angles of the 7th and 8th abdominal segments. As regards habits and occurrence in nature, the *Sabethini*, which are essentially tropical, lay their eggs on leaves, and the larvae inhabit water collected between leaves, or bracts, or more rarely in holes of trees, the amount of water being sometimes very scanty.

The authors recognise four distinct alliances among the *Culicini*, to wit *Dinoceritines*, *Culicines*, *Megarhines*, and *Anophelines*. The *Dinoceritines* have long pilose antennae, with the second segment peculiarly elongate, in both sexes (antennae, in fact, like *Dixa*) ; they are crab-hole mosquitoes (though not the only mosquitoes that breed in crab-holes) and are restricted to the coasts of Tropical America and the West Indies. Of American *Culicines* the authors distinguish only 11 genera, and are somewhat diffident of the rank of some of these. The *Megarhines* are coincident with the genus *Megarhinus*. In the *Anophelines* two genera are included namely *Anopheles* and *Coelodiazesis* (= *Anopheles barberi*).

As regards its descriptive part this third volume includes the *Sabethini* and five genera of *Culicines*, namely *Culex*, *Carrollia*, *Lutzia*, *Culiseta*, and *Mansonia*.

As illustrations of the authors' comprehensive and consistent style of treatment, the genus *Culex* and the species *Culex pipiens* may be selected, all the other genera and species being treated uniformly, as far as possible, on the same plan.

In the case of the genus a full synonymy is given, from the tenth edition of the System of LINNAEUS in 1758 to EDWARDS in 1911. Then comes a

terse generic diagnosis of adult and of larva, and a statement of the geographical distribution of the genus. This is followed by a critical review of the history, limits, and constitution of the genus, and by general remarks upon structural characters, habitat of larvae, egg-laying and eggs, habits, duration of life, etc. Next follows a synoptic table of the American species relevant to the authors' geographical limits.

In the case of the *species*, after the synonymy comes the original description of the Linnean type, and original descriptions of each one of the several species now relegated to the list of synonyms. There follows a sufficient description of the female, the male, the larva, the pupa, and the egg. Finally the species is discussed and criticised as regards its occurrence, habits, breeding-places, distribution, etc.

To praise a work which represents the matured experience and reflection of many years and carries on every page the hall-mark of thoroughness were indeed "wasteful and ridiculous excess," but congratulations at least may be freely offered to Messrs. Howard, Dyar and Knab for having accomplished what must be the highest endeavour of the zoological systematist—which is to search out, lay open and arrange natural facts so that they can easily be understood, verified, and made use of by all men.

A. Alcock.

TROPICAL DISEASES BUREAU.

TROPICAL DISEASES
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1916.

[No. 2.]

ENTERIC FEVERS IN THE TROPICS.

TYPHOID—PARATYPHOID A AND B.

SARRAILHÉ (A.) & CLUNET (J.). La "Jaunisse des Camps" et l'épidémie de paratyphoïde des Dardanelles.—*Bull. et Mém. Soc. Méd. des Hôpît. de Paris*. 1916. Jan. 27. 3 ser. Vol. 32. No. 1-2. pp. 45-60. With 3 charts.

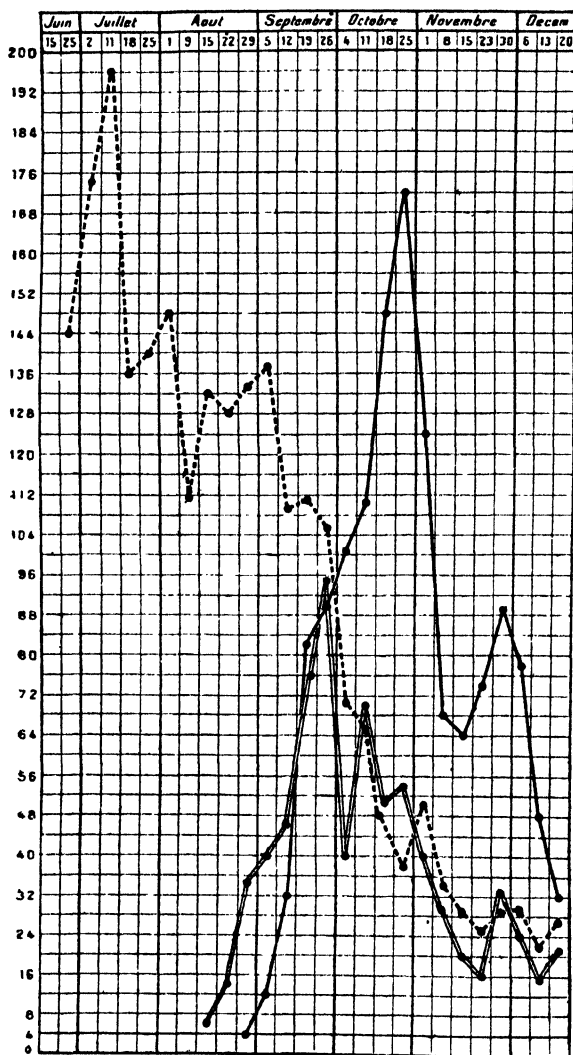
"Camp Jaundice" and the Paratyphoid Epidemic at the Dardanelles. [Extract from the Reports and Memoranda of the Paris Hospital Med. Soc., Jan. 21. 1916 Session.]—*Lancet*. 1916. Mar. 25. pp. 664-668. With 3 charts.

The authors draw attention to records of epidemics of jaundice in camps during warfare, often preceded by "intestinal fever," and state that "one month before the epidemic in the Dardanelles there appeared at Chatby Camp, in Egypt, an epidemic of jaundice associated with an epidemic of febrile intestinal infection." They found in the bacteriological laboratory of the Dardanelles Expeditionary Force favourable conditions for the study of a grave epidemic of "camp jaundice." The number of cases among French troops alone exceeded several thousands. Acknowledging kind help from M. BARBOT and M. BARATTE, Directors of the laboratory, and from colleagues in ambulances and regiments, the authors state that they were able to collect much information. With assistance from Col. DUDGEON, Col. JONES and Capt. BRIERCLIFFE they were able, also, to follow the course of the epidemic as it affected British troops. Soon after the landing of troops many cases of "febrile gastric disease" were noted.

Chart I. gives the weekly figures per 10,000 French and British, from June to December. The curve of the "typhoid group" of illnesses became lower in August but the "epidemic jaundice" began and increased rapidly until, at the end of September, it equalled in importance the earlier attack which it exceeded in October. Troops sent to Serbia took the infection with them and the epidemic of jaundice was still present in Salonika in January. No case of jaundice was observed among troops coming direct from France to Salonika. As no statistics were available it was not possible to determine the relation of the curve

of jaundice to that of "febrile gastric derangement" among the British forces. From reports from intelligent Turkish prisoners it was learned that no cases of jaundice existed among the Turkish troops.

CHART I.*



Weekly figure (per 10,000 men stationed on the Peninsular of Gallipoli) of patients evacuated --- for febrile gastritis (French); == for jaundice (French); — for jaundice (British).

The first case of jaundice appeared about the 10th August among some French sappers exposed to fatigue and hard work in the first line trenches. They were worried by heat, dust and flies. Cases came in

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in twos and threes and from the end of August the disease was found among all formations, and blood cultures showed that it was indeed an infectious jaundice. Before the epidemic of jaundice cases of true typhoid were rare. Most of the sick had been inoculated. The clinical condition which attracted attention during that period was the frequency of sudden attacks. The febrile gastric attacks from the end of August differed somewhat from those of the preceding period.

CHART II.*

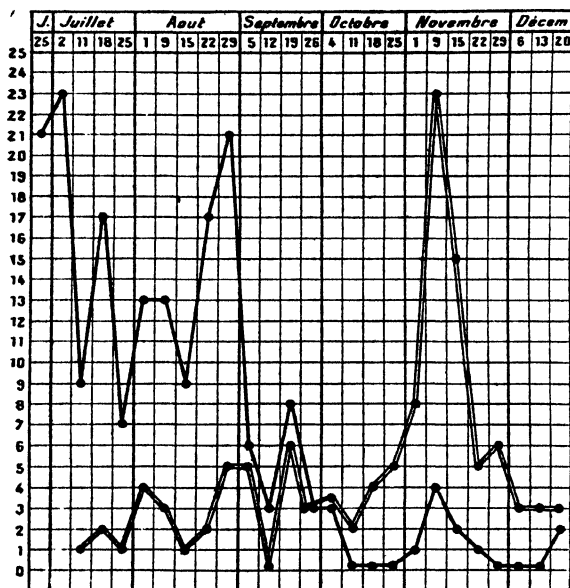


Table referring to the blood culture germs isolated at the Dardanelles from June 10th to December 20th, 1915. Of 606 blood cultures 312 were negative and 294 positive. Of these 294 germs, 182 were identified, including 35 typhoid and 147 paratyphoid B (Curve ———), 112 were atypical from their reactions upon culture media and in presence of the experimental serums (Curve - - - - -). Each point of the curves represents the number of germs isolated during a period of seven days.

True typhoid became still more rare. The epidemic diminished after November and the cases were less serious in type. Frequent hepatic symptoms were noticed: increase in size of liver, tenderness, enlargement of the gall-bladder; suppuration was rare, but one case is noted. The culture showed *B. paratyphosus* "B." The stools, sometimes diarrhoeic, generally became solid during the jaundice; they did not lose colour. Pruritus was absent. Convalescence was generally long with asthenia and often enlargement of the spleen. In a fatal case the post-mortem showed acute fatty degeneration of the liver,

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(C278)

enlarged spleen and visceral haemorrhages. With the febrile cases were others of apyretic jaundice. 202 analyses of urine were made and the results are shown in a table given below.

Albumin.	Urobilin.	Biliary pigments.	Biliary salts.	Number of cases.	Albumin.	Urobilin.	Biliary pigments.	Biliary salts.	Number of cases.
+	+	+	+	35	+	0	0	0	7
++	++	++	0	34	0	0	0	0	7
0	++	0	0	24	0	+	0	+	6
0	++	+	0	20	+	0	0	+	4
+	++	0	0	18	0	+	+	+	4
0	0	+	0	13	0	0	+	+	3
+	0	+	0	12	0	0	0	+	3
+	0	+	+	11	+	+	0	+	1

Even cases of gastric fever without jaundice nearly all showed urobilinuria. From the 10th June to the 20th December, 606 blood cultures were carried out, various media being used. The typhoid bacillus was isolated on 30 occasions; paratyphoid "B" on 102. No paratyphoid "A" were found. In August atypical bacilli were found which though somewhat like paratyphoid "B" did not agglutinate with the experimental serum. Their appearance coincided with the jaundice epidemic and the authors named their paratyphoid "D" (*Dardanellensis*).

J. H. Tull Walsh.

SARRAILHÉ (A.) & CLUNET (J.). La "Jaunisse des Camps" et l'épidémie de paratyphoïde des Dardanelles. (Deuxième note.)—*Bull. et Mém. Soc. Méd. des Hôpit. de Paris.* 1916. Apr. 20. 3 ser. Vol. 32 No. 13-14. pp. 563-567.

This article is a sequel to the note reviewed above. During the epidemic of "camp jaundice" the authors noticed certain atypical bacilli and to this group they gave the provisional name *B. paratyphosus* D. The present, or "second note," has been written with the object of clearing up the nature of these germs.

"The research includes 94 germs isolated by blood-culture in the Dardanelles and considered at the time of their separation as aberrant germs.

"Observed after four to six months of growth and sub-culture these germs did not all behave in the same way." Some remained atypical, some returned to type."

Reaction on Selected Culture Media.

No.	Number of strains examined.	Neutral red.	Lead acetate.	Litmus whey.
I	5	Changed	Darkened	"Chameleon" tints and cloud.
II	51	"	No darkening	Rose-lilac.
III	33	"	Darkened	Rose-lilac.
IV	1	"	No darkening	"Chameleon" change and blue cloud.
V	4	No change	Darkened	Rose then flax blue with late cloud (48 hours); colour changes slow.

Group I, therefore, seems to behave like the ordinary *B. paratyphosus* B; group II like *B. paratyphosus* A, the change of the neutral red taking place rapidly with these germs; group III resembles *B. paratyphosus* A, but darkens the lead medium; group IV resembles *B. paratyphosus* B but does not darken the lead medium, while group V behaves like *B. typhosus* but the colour changes are slow in litmus whey, with late cloud.

Coarse Agglutination with Experimental Serums.

No.	Titre of Agglutination.	Serum Anti-A.	Serum Anti-B.	Serum Anti-Eberth.
I	1 : 2000	0	+	—
II	1 : 2000	+	0 Slight coagglutination up to 1 : 2000 but the serum Anti-A reached 1 : 4000	—
III	1 : 2000	+	0	—
		In 10 cases coagglutination to 1 : 2000 but with A to 1 : 4000		
IV	1 : 2000	0	+	—
V	1 : 2000	0	0	+

Agglutination thus confirms the views gathered from results on culture media.

The authors took with them from the Dardanelles serums from several persons attacked during the epidemic. One of these specimens agglutinated (microscopically) all the para-typhoid bacilli of the epidemic up to 1 : 1000. Six months later, and after changes of temperature due to the voyage, this serum reached a titre of 1 : 500 for all groups.

The above experimental work is followed by some philosophical conclusions and speculations which show that the authors are not content with only the "dry bones" of research:—

"One must not hastily conclude that a microbial variety is new because at the time of isolation and during early culture we observe abnormal cultural characters together with non-agglutinability by specific serums. These peculiarities may disappear or become modified in course of time and with successive sub-cultures, the microbes regaining little by little the reactions of normal types.

"The phenomenon observed is one of Darwinian variation produced by nature under particular conditions of sanitation and climate. This phenomenon has the fugitiveness of most Darwinian variations and has not been able to fix a new variety. It is even probable that aberrant germs propagated in natural surroundings by contagion return more rapidly to normal types than those isolated in artificial media at the period of their variation, and preserved thereafter by sub-culture *in vitro*. Indeed a certain number of our strains from the Dardanelles are still atypical, while in the laboratory at Salonika we observed only a very small number of aberrant strains when the contingents from Gallipoli to Salonika brought their germs with them."

While it is admitted that preventive anti-typhoid inoculation greatly reduced the amount of typhoid fever it is noted that "troops not vaccinated against *B. paratyphosus* A and *B. paratyphosus* B were heavily attacked by these infections."

J. H. T. W.

FRUGONI (Cesare) & CANNATA (S.). *Ittero epidemico al campo da bacillo paratifo B.* [Epidemic Jaundice in the Field due to Paratyphoid B.]—*Sperimentale*. 1916. Apr. 17. Vol. 70. No. 1. pp. 25-40.

Notes made during an epidemic of jaundice in the Italian war-zone on 48 soldiers. By means of EINHORN's duodenal sound pure bile was drawn off from the duodenum and submitted to bacteriological examination. The organisms looked for were:—1, vibrios; 2, haemolytic streptococci; 3, *B. Pfeiffer*; 4, *B. typhosus*; 5, *B. paratyphosus* B; the result being negative for the first three. *B. typhosus* was isolated once, and *paratyphosus* B no less than 11 times, making together 12 cases out of the 48, or 25 per cent., in which typhoidal organisms were present. The soldier from whose bile *B. typhosus* was isolated, had been inoculated against typhoid three times. Of the 11, three had not received any typhoid inoculation, one had had one injection, another one, two, and the remaining six, three inoculations, but against *B. typhosus* only. A positive agglutination to *B. paratyphosus* B in dilutions ranging from 1:50 to 1:200 was obtained in all the 11 patients from whom that organism was isolated, and a positive reaction to the same organism was also obtained in six soldiers, in whom the bacteriological examination of the bile had proved negative. These six men had not been vaccinated against *B. paratyphosus* B previously. In three cases out of the whole 48 *B. paratyphosus* B was isolated in pure culture from the stools. All blood-cultures were negative.

Reference is made to the recent conclusions of sundry French workers as to *B. paratyphosus* B being the causative agent of most of these epidemics of jaundice. [cf. contribution from SARRAILHÉ & CLUNET, reviewed above.]

J. B. Nias.

KENNEDY (Alex. Mills) & RUSSELL (B. R. G.). Relapsing Paratyphoid "A" Infection.—*Brit. Med. Jl.* 1916. Apr. 29. pp. 618-620.

From the details of this case the authors gather the following principal features:—

"1. A relapsing fever, due to infection with *B. paratyphosus* A. 2. Cultivation of the organism from the patient's own blood during the relapses. 3. Absence of diarrhoea. 4. Little or no leucocytosis. 5. Attempt to treat the infection with autogenous vaccine. 6. Absence of agglutinins to the infecting organism until after inoculation of vaccine."

The patient came to England, from Gallipoli via Malta, on October 7th, 1915. Taken ill three days later. Temperature "over 102° F., pulse 100 and respirations 24. He had headache and some vomiting but no diarrhoea, and there was nothing to be made out in any of the viscera; the spleen was not appreciably enlarged." The source of infection was not discovered. "From the 21st day after admission [Oct. 15th] until the morning of the 30th day there was practically no fever." The first relapse occurred on the 35th day of illness; temperatures 101° F. to 105·8° F. High temperature with morning remissions continued to the 44th day. Then "with increasing morning remissions the temperature gradually fell to normal on the morning of the 48th day." On the 58th day another relapse took place and yet another on the 95th day. The pyrexial attacks were alike, with rigors, headache, and some vomiting. Blood culture was made on the 36th day of illness. From cultures "in broth and in sterilized ox bile" "a pure growth of an actively motile Gram-negative bacillus which proved to be *B. paratyphosus* A" was obtained. "It fermented glucose and mannite, but with scanty gas production, gave no change in lactose, turned milk acid, and agglutinated strongly only with a specific paratyphoid A serum." The same bacillus was again obtained during the next relapse and the authors note that "the primary cultures required three and four days' incubation before growth became apparent." A vaccine was prepared and given at intervals in doses from 20 to 80 and 120 millions. "The agglutination titre of the patient's serum to his own *B. paratyphosus* A" was raised to "1 in 80 with a trace at 1 in 160." "On the 39th day of illness," previous to the vaccinations, agglutination with a *B. paratyphosus* A "could not be obtained beyond a dilution of 1 in 5." Otherwise the course of the disease does not seem to have been altered by the vaccine. The urine and faeces were examined, once during a relapse and again during final convalescence, "twenty-seven days after the termination of the last relapse." The authors "failed to recover any paratyphoid or other organism of the typhoid-dysentery group."

J. H. T. W.

SHEWELL (H. W. B.) & MARSHALL (C. Devereux). On Some Cases of Paratyphoid which have occurred in H.M.S. "Euryalus."—*Jl. Roy. Nav. Med. Serv.* 1916. Apr. Vol. 2. No. 2. pp. 169-179.

The authors believe that "owing to the success of inoculation against enteric fever, its power of evil has been so reduced that it need scarcely be considered as a really serious menace in a campaign." As the

result of bacteriological work they regard typhoid, paratyphoid A and paratyphoid B as "three distinct diseases, due to three different organisms." They consider the title "paratyphoid" "most unfortunate," because it has enabled anti-vaccinationists to state "that the profession has "invented" paratyphoid "simply because they know that inoculation is useless." The cases referred to in this article occurred "in and about the Eastern Mediterranean" among soldiers and sailors. It was not possible, except in a few cases, to carry out bacteriological blood tests, but the authors feel that "clinically, there can be no doubt as to the nature of the cases. Their diagnosis was confirmed by Col. WILLCOX, "who, besides seeing and examining eight or ten" of the cases, "felt no doubt as to the nature of the remainder." The cases varied in severity, some patients being very ill indeed; yet so far as the authors know there were no deaths. Some of the cases were transferred to hospital ships and lost sight of.

Four cases are given in full detail. "With two exceptions, all had been inoculated with anti-typhoid vaccine." The attack was frequently sudden. Headache was a marked symptom in "more than one" so "severe as to suggest meningitis." Other signs noted are:—"Tongue on dorsum covered thickly with a lightish-brown fur," often "khaki-coloured"; abdominal signs indefinite, "many cases had no spots at all while in others they were very atypical," rose-coloured spots when seen were like those of typhoid but larger; spleen usually enlarged within first eight or ten days; no enlargement of the liver, no jaundice; urine in most cases normal, but in a few cases a trace of albumin which disappeared after two or three days; emaciation (partly due to scanty diet and high temperature). The authors consider it "a notable fact that after the first few days in bed nearly all the patients complain of feeling very hungry, and this in spite of a temperature ranging from 101° to 103° F. or more." Experience proved the fact "which Col. WILLCOX insisted upon most strongly, that it is unsafe to allow a patient to have solid food until his temperature has been normal for several days, at least five or six." Neglect of this rule was followed by a relapse in one case and by a rise of temperature in one or two other cases. There was slight initial diarrhoea in some cases, but constipation was general throughout. The pulse rate is considered "a useful aid to diagnosis." "It is distinctly slow in relation to the temperature; often soft and compressible, and dirotism has been noticed not infrequently." "The abdominal and other reflexes are retained throughout the disease, whereas in typhoid they are either lost or greatly diminished."

It was not possible to trace with certainty the origin of the disease on board the "Euryalus." It began at Port Iero, Mitylene, which appeared a healthy place. Many of the sailors were on shore duty and day leave was given to the men. Some of the patients "had not left the ship for months." The shore water and the ship's water were pure and "fairly exhaustive investigations" failed to discover "carriers." Flies and dust are considered to be "potent factors in disseminating the disease," and both these troubles were very prevalent. "It is no exaggeration to say that there were millions of flies on board both at Mudros and Suvla at both of which places there was a large number of horses." No drug had any marked effect on the course of the disease, but 15 grains doses of phenacetin relieved

the severe headache and lowered the temperature for some hours. Insomnia was treated with large doses of "bromide." "Cold or tepid sponging is indicated should the temperature rise above 104° F." The authors point out that "it is in preventive rather than curative measures that salvation from the disease lies," and justly think that when a trustworthy anti-paratyphoid vaccine is available "we shall not need to concern ourselves with the question of treatment."

J. H. T. W.

SUMMONS (Walter). Report on the Enterica Cases at the First Australian General Hospital at Heliopolis.—*Med. Jl. of Australia*. 1916. May 6. Vol. 1. 3rd Year. No. 19. pp. 375-377. With 4 charts.

Before entering into the details of the cases of enteric fever described by Lt.-Col. SUMMONS, A.A.M.C., it is important to note that he has, accepting General BARTIE's suggestion, distinguished the various causative bacilli under the generic name *Enterica*. This name has also been suggested independently by others and has much to recommend it. The necessary diagnostic tests were made at the Institute of Hygiene, Cairo, by Captain HUTCHENS, Lt. MYAT and others. The author states that "the blood culture was only of value in the first ten days of illness except in occasional cases in which the organisms persisted; in these cases the symptoms were severe."

"Blood Cultures.—Total performed 178

<i>B. paratyphosus</i> A	..	..	..	..	35
<i>B. paratyphosus</i> B	..	..	..	..	12
<i>B. typhosus</i>	..	..	..	..	3
					—
Total	..	..	..	..	50
					—

Negative results were obtained in 128."

All the patients were Australians who had been inoculated twice with anti-typhoid vaccine within twelve months prior to infection.

"Agglutination Tests.—Total performed 225

With <i>B. paratyphosus</i> A, positive in	..	..	77
With <i>B. paratyphosus</i> B, positive in	..	..	18
With <i>B. paratyphosus</i> A and B, positive in	..	..	2
With <i>B. typhosus</i> , strongly positive in	..	..	28
With <i>B. typhosus</i> , weakly positive in	..	..	37
Negative results were obtained in	..	..	63."

Previous inoculation would no doubt affect agglutination with *B. typhosus*.

It is stated that: "Paratyphoid A and Paratyphoid B seem to be clinically identical. From observations of a single epidemic, it has not been possible to differentiate the various infections except by means of the laboratory tests.

"The clinical aspect of the paratyphoid patient is different from that of the well-known typhoid picture. The patient does not look so ill, in spite of the temperature running on for weeks between 103° and 104°. The rash is decidedly more marked, and may be so distributed that it has some resemblance to that of measles; the spots, however, are situated only on the trunk and limbs, as far as the elbows and knees. They are pinkish, are not confluent, and vary in size, but usually are larger than those seen in typhoid fever. Again, the spots often appear late in the disease, during the third week, and when the fever is on the wane."

As many cases developed while the men were in hospital it was possible to note symptoms from the onset. They were "in order of prevalence" :—

"(a) Gradual, with severe headache, that persists for a week, and an increasing daily rise of temperature ;

"(b) with rigors and high temperature from the start, with little remission ;

"(c) with a prodromal rise of temperature for three to five days, a period of normal temperature, lasting for one to four days, and, finally a prolonged period of fever ;

"(d) simulating acute appendicitis, with vomiting. Some ten or a dozen cases were operated on, and the appendix removed, the inflammation of the appendix being part of a general inflammatory condition of the intestines ;

"(e) with symptoms of acute gastro-enteritis ; and

"(f) with signs and symptoms of pneumonia."

"Relapses were not uncommon, but when they did occur, were manifested by a repetition of the signs and symptoms of a milder degree."

The temperature charts show the usual "stair-case" type, and the bowels, except for some initial diarrhoea, were constipated. One patient died of haemorrhage but less than one per cent. suffered from melaena. The spleen was generally enlarged. Myocardial weakness was common with prolonged convalescence. "Phlebitis, cholecystitis and nephritis were less common complications. Few soldiers will have permanent damage as the direct result of the infection, and out of the 800 cases passed through this hospital there have been only five deaths."

As to the "source of infection and the value of prophylaxis" the author writes :—"The European and Egyptian predominating organism is *Bacillus paratyphosus* B, while in the Gallipoli infection *Bacillus paratyphosus* A has predominated largely. Paratyphoid A is common in India, and it may be that the Indian troops brought this organism." The value of anti-typhoid vaccine is admitted and the hope is expressed that similar vaccines against A and B will produce good results.

J. H. T. W.

LEMANSKI (W.). Quelques observations de fièvres typhoïdes traitées par le vaccin fluoruré.—*Arch. Inst. Pasteur Tunis*. 1916. Apr. 1. Vol. 9. No. 3. pp. 180-188. With 12 charts.

This communication contains the histories and temperature charts of twelve cases treated with a vaccine first issued by the Pasteur Institute of Tunis, in 1914, for protective inoculations against typhoid

fever. The dose used by Dr. Lemanski, 0.5 cc. containing 30 million typhoid bacilli, was injected on alternate days at the beginning of the illness, then at longer intervals. No unsatisfactory results were noticed. It is of course the physician's duty to guide his patients to recovery using the best means available; but where, as in most of these "observations," the treatment includes baths, sponging, camphorated oil, tincture of iodine and pyramidon in addition to the vaccine it is rather difficult to ascribe to each therapeutic agent its proper share in the favourable results. Case II is, however, free from this difficulty:—"M.—admitted about the 12th day of her illness. Sero-diagnosis positive; rose spots; hypertrophy of the spleen; dry tongue; diarrhoea, etc. No baths, no pyramidon [etc.] She received seven injections of the vaccine. The first three on alternate days."

Temperature, on admission 40° C., began to descend after the first dose of vaccine; there was steady improvement and the patient was discharged, cured on the 31st day.

Other cases did well under the combined treatment. Charts iv, v, vi, vii and viii show that the vaccine did not produce any marked effect on the disease.

The author is of opinion "that the hour has not yet arrived when it will be possible to accord entire confidence to anti-berthian vaccino-therapy neglecting general treatment."

[For papers dealing with the successful treatment of typhoid fever with vaccines see *Bulletin*, Vol. 7, pp. 41, 42 and 43.]

J. H. T. W.

TAKAKI (Y.). Some Complications in Typhoid Fever.—*Sei-i-Kwai Med. J.* 1916. May 10. Vol. 35. No. 5. Whole No. 411. pp. 25-27.

The complications are those which lead to perforation of the intestines. The signs and symptoms are given in full detail and, as the author writes, there is but one way of treating this accident and that is by "laparotomy and closure of perforation." Two cases are described. In the first there were two perforations "situated about a foot from the ileo-caecal valve with one inch interval between them. The holes were closed by silk and the part was stitched close to the wound in order to keep watch over leakage." There were no complications and "she was completely cured."

The second case, a male, aged 38, was seized with severe pain, tenderness to right of the umbilicus, quickened pulse and increasing tympanitis during the third week of an attack of typhoid fever. These symptoms led to a diagnosis of perforation, "but in performing laparotomy it was found to be an intestinal obstruction. The obstruction was in the ileum about 7 inches from the caecum and was a horse-shoe

shaped adhesion $2\frac{1}{2}$ inches long. It seemed to have been caused by an acute appendicitis seven years ago (his appendix was excised at the time and he suffered from occasional abdominal pain from that time)." The adhesion was separated but recovery was delayed by pneumonia and myocarditis and only complete four months later.

J. H. T. W.

TRESTON (M. L.). Some Cases of Typhoid and Paratyphoid.—*Indian Med. Gaz.* 1915. Sept. Vol. 50. No. 9. pp. 335–336. With 5 charts.

This is a very condensed paper dealing with cases among Indian troops (37th Dogras, $2\frac{1}{4}$ Gurkha Rifles). The author states that in the cases under observation very few of the signs and symptoms generally characteristic of typhoid fever in colder climates were present.

"Headache was universal and frontal in type. One patient complained of epigastric pain, another of pain in the R.I.F. The other cases gave no pain symptoms."

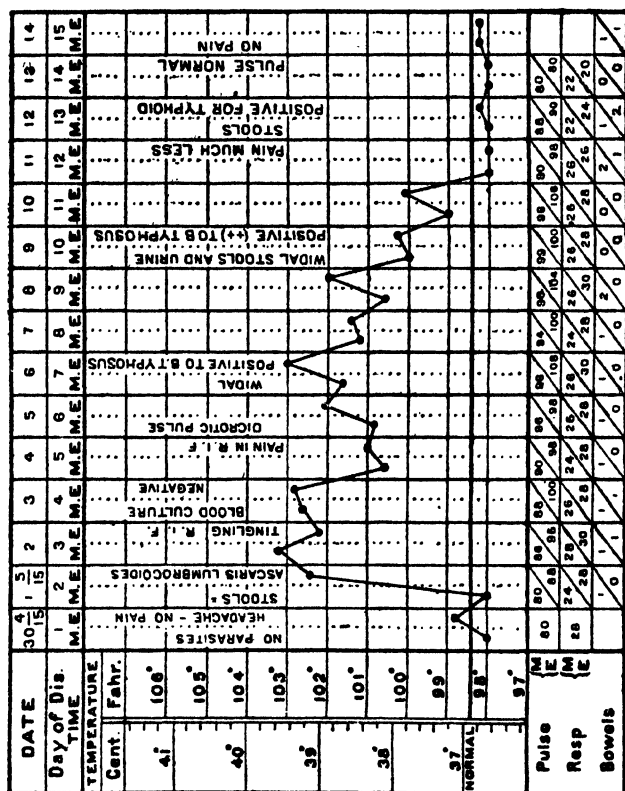
"Fever, distinctly atypical, and though subsiding by lysis, irregular as to time. In no case was the heart in any way affected, the pulse was the usual slow type, showing marked dirotism at the end of the first week and becoming normal at the end of the second week. Blood showed no leucopaenia but eosinophilia was observed in nearly all cases."

The typhoid cases were not serious, there were no deaths and no complications. The paratyphoid cases were of the "A" variety. There were relapses in two cases and two deaths, one from "haemorrhage, lower part of ileum. Three eroded arteries about six inches apart." "The other died from superadded acute pneumonia." [Total number of cases and name of hospital in which they were treated are not given.] In the paratyphoid cases "headache of the occipital type extending down the neck was universal; there was no rigidity." The other marked symptom was "abdominal pain" (80 per cent.) "general or localised in the epigastrium, or in the right hypochondrium, seldom in the R.I.F., coming on towards the end of the first week, never of great severity, and usually subsiding with the temperature." "Here again blood examination yielded marked eosinophilia, and in connection therewith, in five cases (33 per cent.) the ova of *anklystomata* [sic] *duodenalis* found in the faeces, while two other cases served as hosts for the *ascaris*." [It is possible that the cases of typhoid showing eosinophilia were troubled with parasites.] The course followed for diagnosis was:—"Blood culture on the 4th day, Widal on the 10th day, faeces on the 15th day, and urine at about the end of the third week." Culture (MacConkey's); "subculture (Agar); agglutination test up to 1/200 dilution." Food and water supply were examined but no source of infection discovered. Camp followers, etc., were examined and "two typhoid carriers were thus isolated; one a 'sweet-seller,' and the other a butcher."

J. H. T. W.

[August 15, 1916.

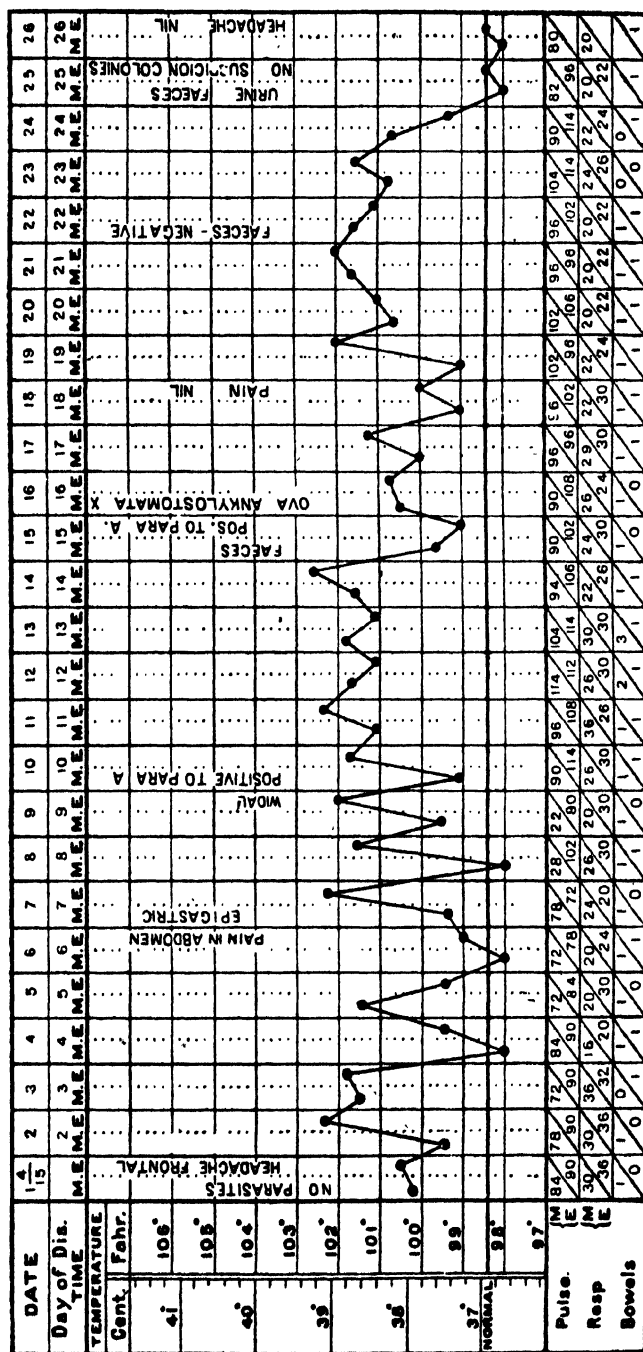
CHART II.



No 2778. S.S.. 37th Dogras. Age 18. Typhoid. No complications. Recovery.

TRESTON (M. L.). *Indian Med. Gaz.*][*Trop. Dis. Bull.*

CHART III.

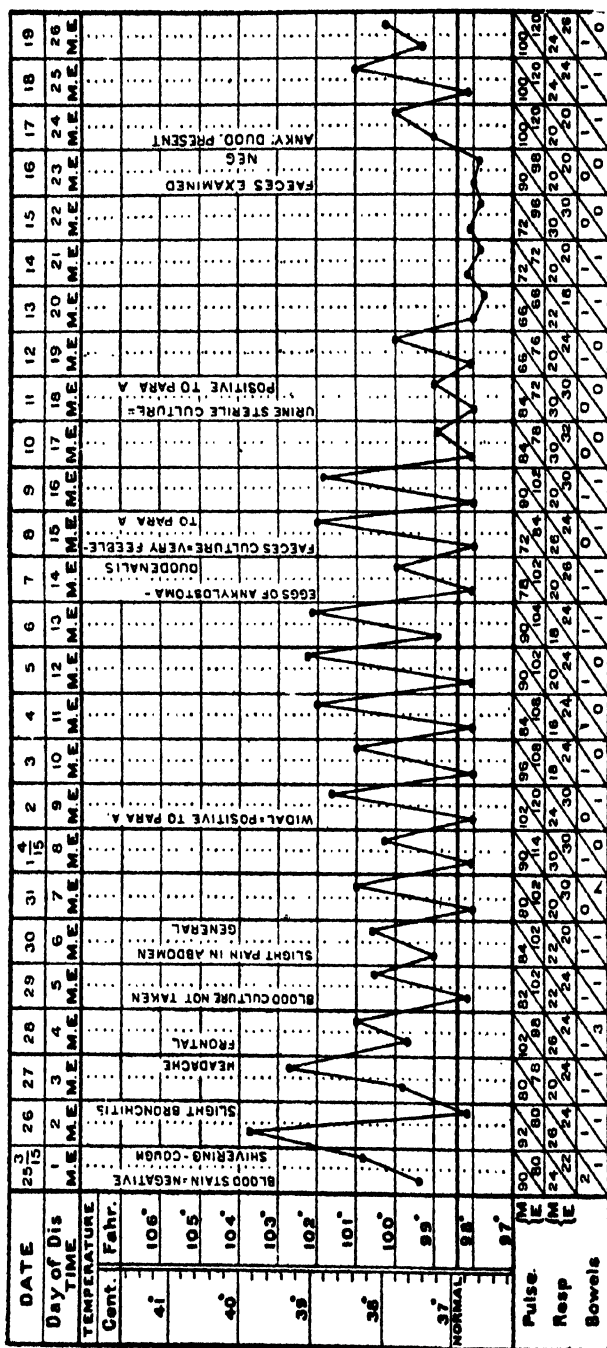


No 3362. R.G., 2/4 G.R.F.F. Age 20. Para-Typhoid, No relapse. Recovery.

[Trop. Dis. Bull. Vol. 8. No. 2.]

TRESTON (M. L.). Indian Med. Gaz.]

CHART IV.

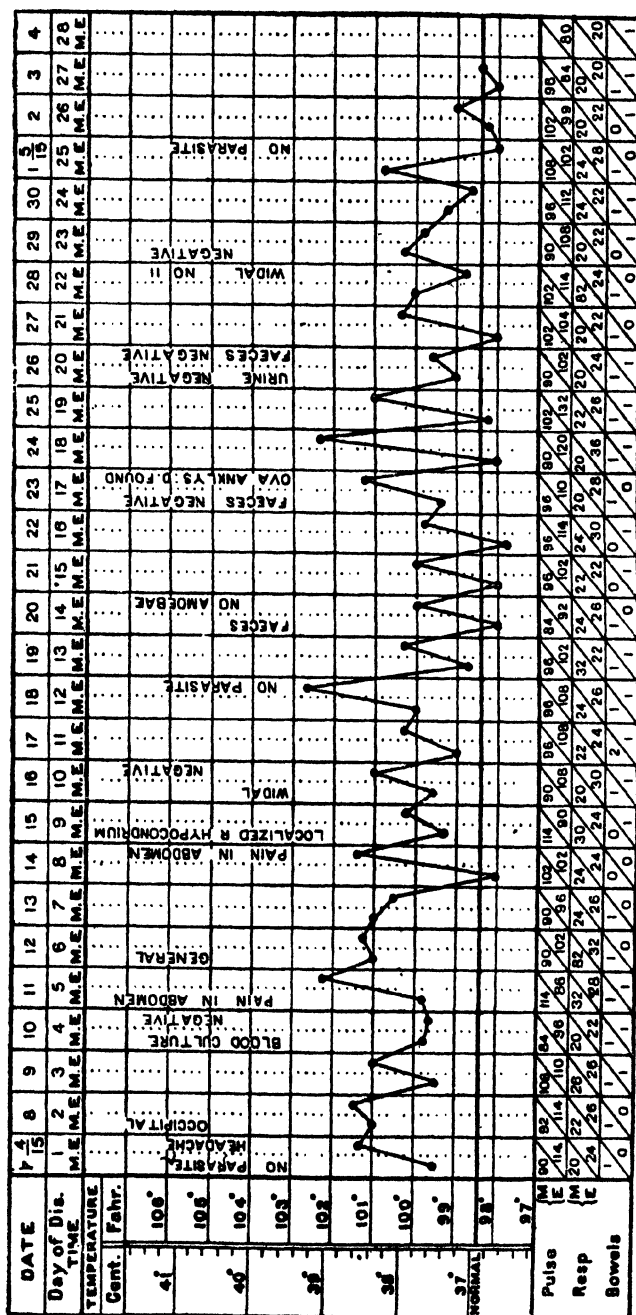


No. 3437. P.L., 2/4 Gurkha Rifles. Age 17. Para-Typhoid. A relapse. Recovery.

[Trop. Dis. Bull.]

CHART V.

TRESTON (M. L.). Indian Med. Gaz.]



No. 3349. Jasbahadur Gurang, 2/4 G.R. Age 20. P.U.O. Recovery.

MONJARDINO (Jorge). *Febre typhoide nos palzes quentes. (Alguns casos).* [Typhoid Fever in Tropical Countries. A Few Cases.]—*Med. Contemporanea.* 1915. Dec. 5. Vol. 33. No. 49. pp. 393-394; Dec. 19. No. 51. pp. 415-418. With 9 charts.

A short paper in which the author recounts his experiences of typhoid fever in Portuguese East Africa, based upon the rather small number of 30 cases, of which six proved fatal. The observations recorded do not do more than confirm what is said in the text-books about the peculiarities of typhoid fever in hot climates; abrupt commencement, fluctuating temperature curve, and so forth. Some interesting temperature charts are given illustrating these points. J. B. N.

GOMES (Emilio). *Febre typhoide no Rio de Janeiro.* [Typhoid Fever at Rio de Janeiro.]—*Brazil Med.* 1916. Mar. 25. Vol. 30. No. 13. pp. 97-98.

A short abstract of a communication made to the Medico-Chirurgical Association of Rio de Janeiro. The author considers that the prevalence of typhoid in Rio in no way depends upon the potable water-supply, but is due to (1) vegetables contaminated by infected irrigation-water, (2) direct contagion from individual to individual, (3) typhoid-carriers, (4) flies. J. B. N.

SERGEANT (Edmond) & NÈGRE (L.). *Vaccinations mixtes anti-typhoidiques et antiparatyphoidiques dans l'Armée de l'Afrique du Nord.*—*Bull. Acad. Méd.* 1915. Oct. 26. Vol. 74. No. 43. pp. 469-472.

The authors mention that M. LANDOUZY called attention in December 1914 to the "increasing frequency in the French army of paratyphoid infections relatively to the number of typhoid infections by Eberth's bacillus." They give a reference to his contribution and to several important communications connected with the question of combining anti-paratyphoid with anti-typhoid vaccine. Observations made in the Algerian Pasteur Institute showed that in Algeria there exists "one case of paratyphoid for three or four cases of true typhoid." "The infections by paratyphoid 'A' are more numerous than the infections by paratyphoid 'B.'" In October 1914 the authors decided to use a mixed vaccine prepared by Vincent's method. It contained 400,000,000 typhoid bacilli per cc., and 200,000,000 paratyphoid per cc.; it was prepared from five strains of typhoid bacilli, two strains of paratyphoid 'A' and one strain of paratyphoid 'B,' "all isolated from Algerian patients. Each man received (in four inoculations) 3,300,000,000 bacilli."

"From the 12th October 1914 to the 12th October 1915 there were issued to the army of North Africa 583,207 cc. (for 106,037 vaccinations) of the triple, mixed anti-typhoid and anti-paratyphoid vaccine. More than 100,000 vaccinations were carried out. The reactions, local and general were not more marked than in the 37,000 vaccinations done in the same area with a simple anti-typhoid vaccine prepared in the same way. This vaccine was shown to be efficacious against both paratyphoid A and B and against typhoid fever."

The results are stated to have been favourable and General MOINIER and Medical Inspector General E. CALMETTE were surprised to find the typhoid wards in the military hospitals closed. "The almost total suppression of cases of typhoid and also of paratyphoid among soldier;

properly vaccinated dates from the autumn of 1914." Rare cases occurred among some who had escaped vaccination. There was a marked contrast between this state of affairs and the epidemic which continued as usual among the Algerian civil population. Among the garrison of Algiers, almost all vaccinated, there were no cases of typhoid or paratyphoid, while 14 occurred among certain soldiers not inoculated or insufficiently protected.

J. H. T. W.

COPPINGER (C. J.) & GIBSON (H. G.). **Inoculation of Man with Mixed Vaccines containing *Bacillus typhosus*, *B. paratyphosus* A, and *B. paratyphosus* B, with Regard to the Reaction produced and the Antibody Formation.**—*Jl. Roy. Army Med. Corps.* 1916. May. Vol. 26. No. 5. pp. 581-596.

The authors are officers in the "R.A.M.C." and the men chosen for inoculation were men of that corps not specially selected, "except in so far as was necessary to ascertain that they had neither suffered from enteric fever nor had been previously inoculated." This refers to groups A, B, C, and E. Group D contained six men, inoculated at the Royal Army Medical College. Three of this group had previously been inoculated with anti-typhoid vaccine. The men in the other groups were inoculated at the R.A.M.C. Depot at Aldershot.

Groups A and C—Inoculated on the afternoon of December 3rd, 1915. They were excused duty on the Saturday and Sunday and all of them returned to duty on Monday, December 6th.

Seventy-three men (Group C) received a single dose of 1 cc. of a vaccine containing *B. typhosus* 1,000 million, *B. paratyphosus* A and B, of each 750 million. Forty-eight men (Group A) were inoculated with 1 cc. of a vaccine containing *B. typhosus* 1,000 million, and *B. paratyphosus* A and B, of each 500 million. It was discovered that 35 men in this group had, about five days before, been vaccinated against small-pox. No other men being available the experiment was carried on.

"After a certain number of inoculations in the left arm, the remainder of those showing signs of inflammation due to cow-pox were inoculated in the right arm." Fifty-two men in Group C had also been vaccinated seven days previously, but "a greater number of the '500-million' series were inoculated in the vaccinated arm than was the case in the '750-million' series."

The onset of reaction was earlier than in inoculation with a simple anti-typhoid vaccine and many of the men stated that they began to feel ill two and a half to three hours after inoculation. Local reaction was more marked, with redness and swelling and pain, seen to a greater extent in Group C than in Group A. The temperature of each man was taken 4 hours, 17 hours and 27 hours after inoculation. The febrile reaction was greater in the "500-million" series in whom the cow-pox vaccine was more active but "on the whole the general reactions were not more severe than those observed when one cubic centimetre of typhoid vaccine was given in August and October, 1914."

The vaccine used for these groups was prepared as follows:—

"A trypsin broth culture of *B. typhosus* grown for forty-eight hours, and was heated for one hour at 53° C., after which lysol was added to such an amount that the final lysol content was 0.4 per cent.

"The paratyphoids were grown separately on trypsin broth agar in Roux bottles for forty-eight hours, washed off with normal saline, heated for one hour at 53° C., and then had lysol added as in the case of *B. typhosus*."

The bacilli were counted before killing and the three vaccines mixed.

Group B, 12 recruits, received 1 cc. of a vaccine similar in numerical value to that given to Group A, but in this instance *B. typhosus* was grown on agar as in the case of the paratyphoids. There was nothing remarkable about the local reaction and the authors state that "the general reaction following the use of this vaccine was distinctly less than that following a similar dose of a broth vaccine, but somewhat delayed in its development." The local reaction was less.

Group D, six men, received two doses of the "500-million" vaccine, 0.5 cc. followed, after an interval of ten days, by 1 cc.

Group E, 90 men, received 0.5 cc. and subsequently 1 cc. of the "750-million" vaccine and both local and general reactions were mild.

From each of these groups a certain number of men were selected ten days after the inoculation for estimation of agglutination production. "The end-point of agglutination was determined by arranging the specimens of blood from each group in batches of five or six and pooling the sera of each batch." Similar estimations were carried out 21 days and 42 days after the final date of the inoculation. The method employed was as follows:—"The agglutinin content of the blood was estimated twenty-four hours after the blood had been drawn off. The emulsion was drawn well up into the shoulder of a capillary tube, placed in the 37° C. incubator for two hours and the result was finally read at the end of twenty-four hours." The authors lay stress on the necessity for uniformity of information as to methods employed and ascribe divergent results to "the use of different methods of estimation."

As to the general results they are well shown in Chart III.

In Group D the authors "were in some cases able to estimate the opsonin production as well as the agglutinins produced." "The antibody production was first estimated in this group and the two seemed to follow each other so closely that for purposes of comparison between the groups the opsonin estimation was afterwards dropped."

Charts I and II give the results in two examples from Group D.

"The opsonin production in this series of experiments was estimated after heating the serum for half an hour at 55° C. The emulsion used was twenty-four-hour culture on agar emulsified in normal saline and standardized to contain 1,000 million organisms per cubic centimetre. The mixture of serum, blood cells, and emulsion was then placed in water-bath for fifteen minutes. Klien's method* of estimating the end-point was used, taking 0.5 organism phagocyted per cell as standard."

The authors' conclusions are:—

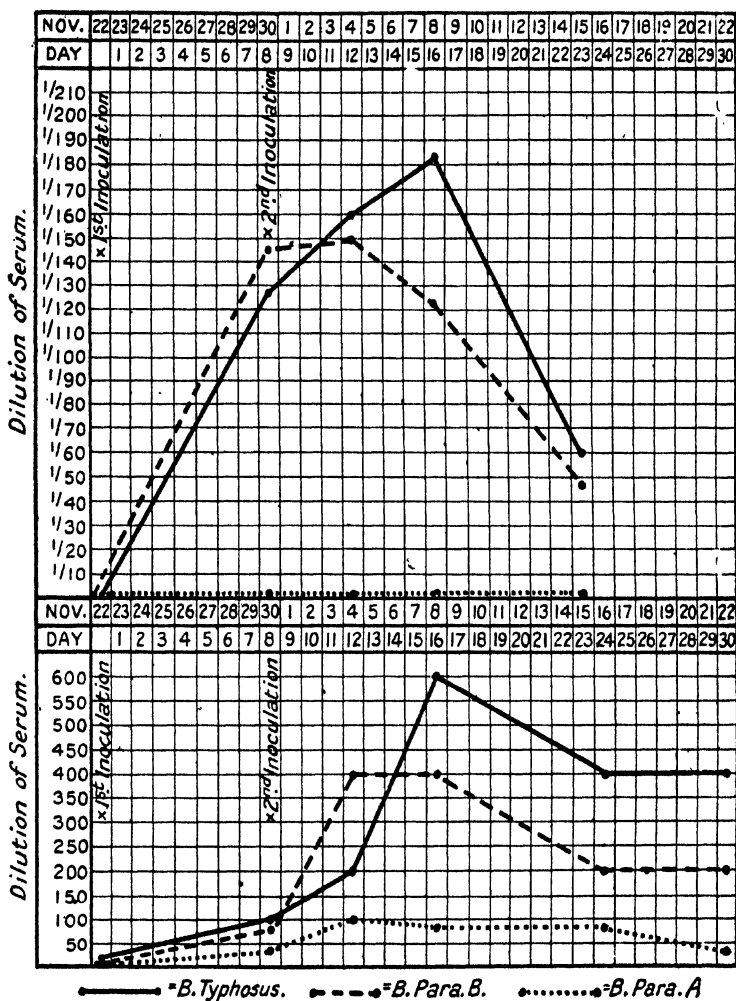
"(1) That the highest dosage used is the best for producing lasting antibodies against these three organisms, and that the vaccine should be given in two doses rather than in one [cf. Chart III, Groups C and D] both on account of the reaction produced by a single dose of one cubic centimetre, and also on account of the higher antibody content produced when two doses are given."

"(2) The want of antibody production for *B. paratyphosus* A is a very strong feature of these experiments when compared with those elaborated for *B. typhosus* and *B. paratyphosus* B. As to the immunity produced against this organism, that can only be decided by actual trial, but the results obtained in the course of these experiments seem to point to the fact that the *B. paratyphosus* A content of the vaccine may not achieve its object to the same extent as that of *B. typhosus* and *B. paratyphosus* B."

J. H. T. W.

Thermostable opsonins.* End-point equals 0.5 organism per cell phagocytosed (Klien's method).

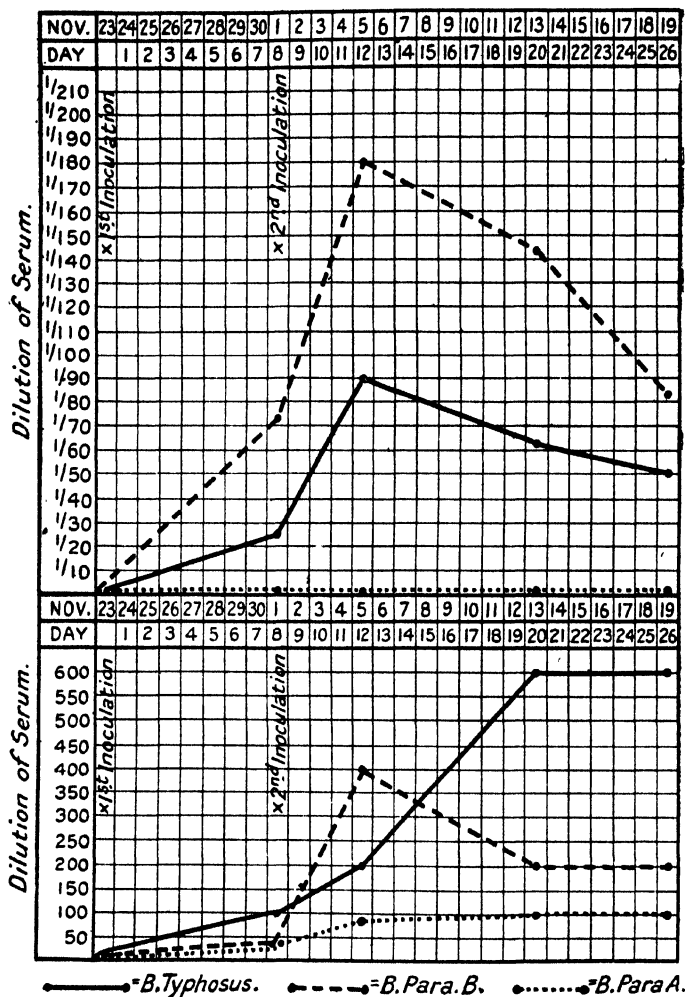
Agglutinins.



*CHART I. The above represent the agglutinin and thermostable opsonin curves of a man in Group D receiving two doses of a vaccine containing 1,000 million *B. typhosus*, 500 million Para. A, and 500 million Para. B per cubic centimetre. The opsonin content of the serum for *B. paratyphosus A* is shown along the base-line as the end-point was never demonstrable in a higher dilution than 1:9, which is no better than some of the normal controls. This man had very little reaction.

Thermostable opsonins. End-point equals 0.5 organism per cell phagocytosed (Klien's method).

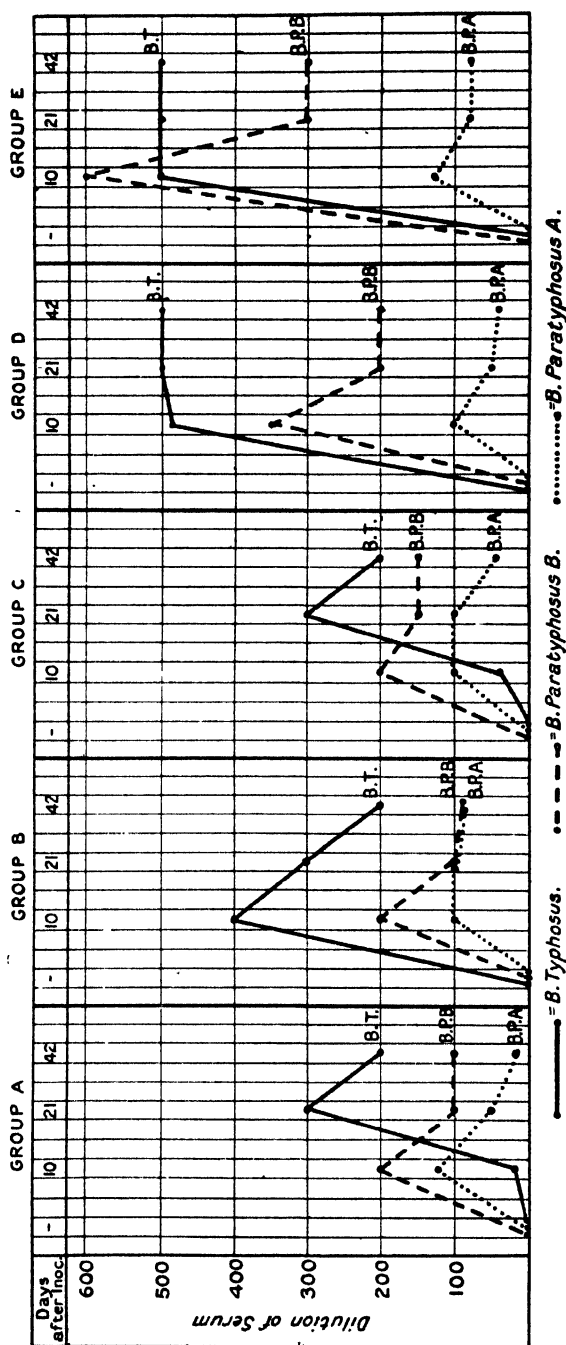
Agglutinins.



* Chart 2. The above represents the agglutinin and thermostable opsonin curves of a man in Group D receiving two doses of a vaccine containing 1,000 million *B. typhosus*, 500 million Para. A, and 500 million Para. B per cubic centimetre. The opsonin content of the serum gave the same result as in the case of Chart I. This man had a severe reaction after the first dose. This was apparently due to the *B. typhosus* part of the vaccine, and is reflected in the opsonin curve.

COPPINGER (C. J.) & GIBSON (H. G.). *Jl. Roy. Army Med. Corps.*][*Trop. Dis. Bull.*

Agglutinins.



*Chart 3. The interval of 10, 21, and 42 days indicates the number of days after the single dose of 1 c.c. of the vaccine in the case of Groups A, B and C, in the case of Groups D and E the number of days after the second dose of vaccine. For the doses received by the different groups see the first paragraphs of this paper.

MACLAREN (J. P.). Anti-Typhoid Inoculation at Tokai Convict Prison.
—*S. African Med. Rec.* 1916. Jan. 8. Vol. 14. No. 1. pp. 9-12.

The prison at Tokai is used for sick coloured convicts from the Cape Province. Early in 1915 most of the inmates were removed to make room for European, rebel prisoners. "In April, five cases of enteric fever occurred within 18 days." The author procured "prophylactic typhoid-paratyphoid vaccine" from the Institute for Medical Research, Johannesburg. Inoculation was started on the 19th April. "The potency of [the] vaccine was 1,000 million bacilli per cc. and the treatment consisted of two doses, the first of 9 minims or $\frac{1}{2}$ cc. and the second, 7 to 13 days after, of 18 minims, or 1 cc. injected under the skin at the insertion of the deltoid muscle." The inoculation was voluntary and the usual instructions were followed.

"Out of 201 field rebel (European) prisoners 155 submitted to first inoculation;" only 105 submitted to the second inoculation so that 90 out of 201 were unprotected. There were no troublesome results and "after the inoculation was completed" only two cases of enteric fever occurred, one of these "was not really a new case as later on it was established that he had been sickening from the fever before he was inoculated." Both these men were only partially protected. "Of the 105 who were inoculated twice none took enteric fever."

All the coloured convicts remaining in the gaol were inoculated "except eight cases with very grave heart disease, three with epilepsy, and one with dropsy." A list of diseases from which the inoculated convicts were suffering is given below:—

V. D. Heart, etc.	50
Syphilis	70
Gonorrhoea	30
Senility	25
Cripples	32
Hernia	9
<i>Tuberculous.</i>	
Phthisis Pulmonalis	3
Necrosis of Bone	2
Glands	1
<i>Respiratory.</i>	
Laryngitis	1
Bronchitis	2
Asthma	2
Pneumonia (old)	2
Debility	6
Favus	3
Weak-minded	5
Paralysis	2
Bright's Disease (Chr.)	2
Arterio-Sclerosis	2
Stricture of Urethra	3
Rheumatism	2
Haematuria	1
Cirrhosis of Liver	2
Loss of One Kidney	1

[*Trop. Dis. Bull.*MACLAREN (J. P.). *S. African Med. Rec.*]

Table showing Relation of Diarrhoea (D) and Constipation (C) to High Temperature and Gravity of Case.

	1st week.	2nd week.	3rd week.	4th week.	5th week.	6th week.	Case complicated by inflammation of Liver, from old malaria.
1 ..	T. high D.	T. high D. $\frac{T. \text{ low } C.}{T. \text{ low } C.}$	T. high D.	T. high D. $\frac{T. \text{ low } C.}{T. \text{ low } C.}$	T. low C.	T. normal C.	Relapse in 2nd week, and in 3rd and 4th weeks, prostration so grave and hectic that recovery despaired of.
2 ..	T. high D.	T. high D.	T. high D.	T. high C.	T. normal C.	T. normal C.	Terrible haemorrhages in 4th week; recovery miraculous, as he had also a double pneumonia. Only physique pulled him through.
3 ..	T. high C.	T. high C.	T. high C.	T. normal C.	T. normal C.	T. normal C.	Longest maintained temperature and highest evening rise—three degrees daily; yet never seemed distressed; uninterrupted daily fall till normal reached.
4 ..	T. high D.	T. high D. $\frac{T. \text{ low } C.}{T. \text{ low } C.}$	T. normal C.	T. normal C.	T. normal C.	T. normal C.	Mildest case; never "oppressed."
5 ..	T. high C.	T. high D.	T. low C.	T. high C.	T. high C.	T. normal C.	Two injections of anti-typhoid vaccine; relapse in 5th week; small haemorrhages 21st day, but never deemed dangerous.
6 ..	T. high C.	T. low D.	T. high C.	T. high C.	T. low C.	T. low C.	One injection; relapse in 4th week, but never deemed dangerous.
COLOURED 7 ..	T. high D.	T. high D.	T. normal D.	T. normal D.	T. normal D.	T. normal D.	Greatest prostration of all; lay as if moribund for a fortnight; his recovery like a "resurrection."
8	very T. high C.	T. high C.	T. normal C.	T. normal C.	T. normal C.	T. normal C.	Highest temperature of all at first; but made quickest recovery. This case came from outside prison, with temperature over 105, on the evening after admission.

From this it will be clearly seen that the constipation cases did best, and the diarrhoea worst, e.g.: 1, 2, 7.

Dr. Maclaren writes :—

"The list will be of great interest, I think, to the profession here, as the records hitherto of inoculations are amongst soldiers or volunteers, who are presumably in good health. It will show more conclusively than anything else could how harmless the inoculation is."

In addition to the 258 included in the above list 407 hard labour, coloured convicts were inoculated with no bad results, "no case having even been taken into hospital."

Three of the cases were very severe but all recovered. To show that "vaccination done after [infection] will not stop the disease" a case is given in detail :—

"Case No. 5 reported sick nine days after a first inoculation, and, after consultation, was given a second injection of vaccine the day after admission, i.e., ten days after first inoculation, as there was a hope that it might not prove enteric fever. But the sequel proved that it was, and that the disease had got the start of the injections. . . . They certainly did not cut short the disease. His temperature did not become normal till the twenty-first day, and on the twenty-fourth he developed a severe relapse, the temperature rising to 104.5° F., and not becoming normal again till the forty-second day, when he went straight on to recovery."

J. H. T. W.

SCHWARZ (L.). Ueber die Typhusschutzimpfung der Kaiserlichen Schutztruppe für Deutsch-Südwestafrika. [Protective Anti-Typhoid Inoculation of Troops in German South-west Africa.]—*München Med. Woch.* 1916. May 16. Vol. 63. No. 20. pp. 726-727.

The work recorded was done during mobilization in 1914. Six different strains of typhoid bacilli were used and 1 cc. contained 400 million with 0.5 per cent phenol—2,700 million were given in five doses as follows :—

(1) 0.25 cc.; (2) 0.5 cc.; (3) 1 cc.; (4) 2 cc.; (5) 3 cc.

The intervals between the injections were generally six or seven days. As it was not possible in every case to keep strictly to these intervals, where 14 days had elapsed after an inoculation the next dose was not increased but the last dose was repeated. There was no marked general or local reaction although redness and some pain occurred at the site of inoculation. In a series of protected men, 8 to 14 days after the last injection, the agglutination reaction was determined against living *B. typhosus*. In one case the titre was 1 in 1,600. In most of the cases it was between 1 : 200 and 1 : 800. In one case the titre reached only 1 : 50. In several men a reaction equal to 1 : 100 was observed about five months after the last injection. Many of those who received the protective vaccine were attacked by typhoid fever at various periods after the date of inoculation. Among 180 cases observed by the author there were no deaths, while there was a high mortality among the unprotected. Some of the people mobilized as Protectorate troops who had suffered from typhoid during the previous ten years were not inoculated. Some of these persons are reported to have suffered from typhoid fever. The author thinks that acquired immunity is lost sooner in hot climates owing to excessive cutaneous metabolism [*erheblichen Hautstoffwechsel*].

J. H. T. W.

CHANG CHIA-PIN. Ueber das agglutinatorische Verhalten der Sera von gesunden (bzw. nicht an Typhus oder Paratyphus leidenden) Chinesen gegenüber Typhus- und Paratyphusbacillen. [The Agglutinating Property of the Sera of Healthy Chinese (that is not suffering from Typhoid or Paratyphoid) towards Typhoid and Paratyphoid Bacilli.]—*Centralbl. f. Bakt.* 1. Abt. Orig. 1916. Mar. 22. Vol. 77. No. 5/6. pp. 435-440.

This is a series of experiments dealing with the agglutinating reaction of the sera of healthy Chinese (not suffering from typhoid or paratyphoid fever) towards typhoid and paratyphoid bacilli. The work has been done by a Chinese student of medicine in the German Medical School for Chinese in Shanghai. Fifty sera were tested against *B. typhosus* and of these only ten are noted as "gesund" (healthy). The others from whom serum was taken suffered from various diseases and injuries, such as "Syphilis," "Malaria," "? Fever," "Fracture of the Radius," etc.—1 : 10 is the most common figure in the "table" given ; a few cases rose to 1 : 30 and one case to 1 : 40.

The second "table" records 50 examples of serum, taken from the same classes of individuals, and tested against *B. paratyphosus* B. Here again the highest titre is 1 : 40 and the most common titre is 1 : 10.

It will thus be seen that the serum of the Chinese has the same power of reaction as that of other races. The author gives a full Bibliography.

J. H. T. W.

ŠVESTKA (Vlad.). Beitrag zur Epidemiologie der Paratyphus A-Infektion.—*Wien. Klin. Woch.* 1916. Apr. 20. Vol. 29. No. 16. pp. 480-481.

This paper is "A contribution to the epidemiology of paratyphoid A-infection" as observed among Austrian troops on the Eastern battle-front. The author notes that previous to the present world-war infection by *B. paratyphosus* A was seldom seen in Europe and little was known of this type of paratyphoid fever. With the war and its consequences the disease was introduced into certain parts of Germany and Austria. During a period of three months the author was able to study 13 cases, occurring among troops that had been fighting in East Galicia. Twenty-seven cases recorded by SCHMITZ and KIRSCHNER (*Munchener medizinische Wochenschrift* 1916, No. 1) came from the same locality. From the cases under his care the author was able to isolate *B. paratyphosus* A:—Seven times by blood culture in ox bile ; five times from the stools and once from the urine. The strains of bacilli reacted in certain media as follows :—

"Plating," Endo's method.	"Plating," Drigalski.	Milk.	Glucose.
Small, transparent rose colonies.	Small bluish colonies.	0	No gas formation, except with one strain where a stab- culture in glucose agar showed slight gas formation.

The bacilli agglutinated with serum supplied by the Serotherapeutic Institute, Vienna from 1 : 3000 often up to 1 : 12000. There was no coagglutination either with *B. typhosus* or with *B. paratyphosus* B.

With serum taken from the author's patients and paratyphoid A bacilli the Gruber-Widal reaction was either negative or very slight, although similar bacilli were present in the blood, stools and urine of these patients [for absence of antibody in paratyphoid A fever compare "COPPINGER and GIBSON," this number, p. 91].

It is the author's opinion, supported by that of other observers, that :—

"Paratyphoid A is especially a disease of warm countries. In Dutch India, Ceylon and such regions it is common. It has apparently been brought to us by Russian troops coming from southern regions of the Russian Empire. I can in this connection remember that four years ago, when I was travelling in the Crimea and Caucasus a doctor in Odessa drew my attention to the relative frequency of this disease in the area near the Black Sea.

"The possibility of infection by paratyphosus A, especially in military stations, must be reviewed, and the usual research material (blood, stools and urine) be examined, both among the sick and among the convalescents, for *B. paratyphosus* A."

J. H. T. W.

HALLINAM (J. J.) & ROAF (H. E.). *The Incubation Period of Paratyphoid B Fever.*—*Brit. Med. J.* 1916. June 24. p. 885.

In the case described *B. paratyphosus* B was found in the stools some time before the onset of the disease. Admitted to hospital on September 23rd, 1915, the patient was supposed to be suffering from dysentery. Examination of the stools disclosed the presence of *B. paratyphosus* B. A microscopic serum test was negative. On October 5th the patient's temperature began to rise and on October 7th the bacillus was isolated from his blood. On October 25th a further serum test gave agglutination in a dilution of 1 in 1,000. The authors' conclusion is that "this case shows that *Bacillus paratyphosus* B can be present in the intestine at least twelve days before the onset of the fever and that cases which develop in hospital are not necessarily infected in hospital."

The Enterica group of bacilli may exist in the intestines of "carriers" for months and are found in apparently healthy people. The Coli-dysentery-enteric bacteria may become virulent under conditions not fully understood, but which seem to be accompanied by some chemical substance which causes the urine to react to the "dialo" test [*v. Indian Medical Gazette*, 1893, June].

J. H. T. W.

DUDLEY (S. F.). *Note on a Typhoid Carrier.*—*Lancet*. 1916. Apr. 29. p. 914.

An interesting note showing the danger of the "carrier" and persistence of infection. Previous to April 1911 H.M.S. "Formidable" was free from typhoid. Between that time and March 1914, 28 cases occurred. Other ships, serving under similar conditions, were free from the disease. Sanitation, food and water supplies were investigated and found free from suspicion. A carrier was sought for among men serving on the ship before April 1911 and among men who had

suffered from typhoid. The first investigation gave no *B. typhosus*, but one man gave a positive Widal reaction. He was re-examined three times and on the third occasion the bacillus was found in his faeces. In October 1898 the man was admitted to the R.N. Hospital, Chatham, suffering from typhoid fever. Being a ship's cooper his work brought him in contact with food when casks are opened and rations served out to the crews. The following table is given by Staff-Surgeon Dudley showing ships on which the man served and the cases of enteric fever that occurred while he was in them.

Table compiled from the Journals of the Various Ships.

Ship.	Date of Joining.	Place where serving.	Cases of Typhoid.	Died.
Pembroke ..	June 15th 1898	Home	—	?
Orlando ..	Feb. 15th 1899	China	2	?
Pembroke ..	July 26th 1902	Home	5 (12)	?
Immortalité ..	Aug. 27th 1903	Home	1	1
Endymion ..	Jan. 18th 1905	Home	1	1
Albion ..	May 8th 1906	Channel	1	—
Majestic ..	Feb. 26th 1907	Home	2	?
Venerable ..	Jan. 7th 1908	Channel	4	?
Implacable ..	Feb. 2nd 1909	Atlantic	6	2
Pembroke ..	Apr. 1st, 1910	Home	2	?
Caesar ..	June 7th 1910	Home	1	?
Formidable ..	Apr. 4th 1911	Home	28	7
			53	11

Of the 12 cases in the "Pembroke" five occurred in the naval barracks where the carrier was living. On April 24th 1914 the man was sent to the Chatham hospital. While in hospital the urine was sterile and blood culture negative. Widal reaction positive to 1/150—*B. typhosus* at intervals; in 17 examinations, about every fourth day, the bacillus was found seven times. The man was invalided out of the service and the Medical Officer of Health of his district was informed.

J. H. T. W.

WORSTER-DROUGHT (C.) & KENNEDY (Alex. Mills). *Acute Urinary Infection with Paratyphoid B Bacillus.*—*Brit. Med. Jl.* 1916. May 6. pp. 649-650.

The chief features of this case are summarised by the authors as follows:—

1. Pyuria due to a pure infection with *B. paratyphosus* B.
2. The absence of the usual signs of paratyphoid fever.
3. The successful treatment with autogenous vaccine and hexamine.
4. The patient had not been abroad.

Private—aged 17, A.S.C., admitted to the Royal Herbert Hospital, Woolwich, December 31st, 1915. No previous illness and feeling well up to day before admission. The symptoms, stated briefly, were:—Difficult micturition with intense desire; a "shivery" feeling and

pain in the abdomen. Febrile conditions present, temperature 103° F. and pulse 112. Tenderness over bladder and much albumin in the urine. On January 1st there was incontinence and pus in the urine. On that day Hexamine gr. x, sodii acid. phosph. gr. xv, syr. aurantii \mathfrak{z} i, aq. ad. \mathfrak{z} ½ was prescribed and given, three times daily, throughout the illness. *B. paratyphosus* B was recovered from the urine on January 3rd; it "agglutinated strongly only with a specific paratyphoid B agglutinating serum." It was again found in pure culture on January 10th. Blood culture was negative. The autogenous vaccine was given—50 millions—on January 11th. On January 13th the reaction of the patient's serum to his own bacillus was positive to 1 in 100. The patient was free from pain and felt better. On January 16th 100 millions of the vaccine were given and the amount of pus in the urine became greatly reduced. From January 7th to 15th the temperature rose to 101° F., about, in the evening and was normal in the mornings. From January 16th it was normal. The pulse "varied with the temperature."

"On January 18th no paratyphoid B or other organisms could be recovered from the urine and no pus cells were observed on microscopical examination. On January 20th tenderness over the bladder had disappeared, frequency of micturition had gone, and the patient felt quite well; a faint cloud of albumin only was present in the urine."

Doses of 250 and 500 million B bacilli were given with an interval of six days. There was slight local reaction to the dose of January 29th and the patient's serum agglutinated his own bacillus up to 1 in 400. From January 18th no bacilli were found in the urine. A final dose of vaccine, 1,500 millions, was given on February 24th and the patient, "perfectly well," left the hospital on March 10th. The faeces were examined several times after February 21st but no bacilli of the typhoid group were found. The spleen was not enlarged, there were no "spots," no vomiting, no early diarrhoea and only "slight headache," and the "shivery" feeling.

J. H. T. W.

COLES (Alfred C.). **An Easy and Rapid Method of doing Widal's Reaction for Typhoid.**—*Brit. Med. Jl.* 1916. May 13. p. 684.

1. With a grease pencil or piece of wax draw a line across the middle of two slides at right angles to their long axes.

2. Spread a thin film of the patient's blood on one half of each slide; when that is dry spread a film of blood from a person who has not had typhoid and has not been protectively inoculated against it, on the other half of each slide, as a control. Dry.

3. With platinum loop or pipette place a drop of emulsion of killed typhoid bacilli on the centre of each half of both slides and rub well over the film of blood. Do not pass from one half to the other without sterilizing the needle.

4. On one slide place a cover-glass on each half keeping them well separated by the mark of the grease pencil.

5. Place the other slide on a piece of wet blotting paper and cover with a Petri dish to prevent evaporation for fifteen to twenty minutes. Then dry over the flame and stain.

"Examine both halves of the first slide under a moderately low power. At the end of fifteen minutes (often much sooner) distinct clumps of

agglutinated bacilli will be seen, provided the case be one of typhoid or the blood of one who has been prophylactically inoculated with a typhoid vaccine, whilst on the other half, the control, the bacilli show no signs of clumping. The films, stained with Leishman or Giemsa's stain, will show on one half patches of agglutinated bacilli, whilst on the control half the typhoid bacilli are more or less uniformly spread over the film."

Emulsions of killed *B. paratyphosus* A, or *B. paratyphosus* B can be used for diagnosis in the same way. Leucocytosis, suggesting the absence of typhoid, can be determined when examining the stained films.

J. H. T. W.

TRILLET (A.) & FOUASSIER (M.). **Etude de quelques facteurs exerçant une influence sur la rapidité de l'évolution du B. typhique dans le lait.**—*C. R. Acad. Sci.* 1916. May 29. Vol. 162. No. 22. pp. 849–852.

In a previous Note (*C. R. Acad. Sci.* 1913, Vol. 156, p. 1936) the authors had shown that *B. typhosus* diluted in water or bouillon in minute doses such as would not be detected by bacteriological examination would, however, when introduced into milk proliferate more or less rapidly. Thus 1 cgm. of moist bacilli diluted to 500.000.000 showed rapid growth, attaining infinity after about 24 hours' incubation at a temperature of 30° C. The present contribution has for object the enlargement of our knowledge of this question, under certain experimental conditions.

I. Sterilized milk was infected with one drop of an emulsion, freshly made, by scraping 5 mgm. from the surface of an agar culture and adding 10 cc. of sterilized water. Bouillon was similarly infected.

No.	Time.	Milk Col. per cc.	Bouillon Col. per cc.
1	After 5 minutes	> 4000	< 3000
2	" 10 "	7000	3000
3	" 20 "	8500	3000
4	" 40 "	9000	3000
5	" 1 hour	∞	3000

It was not until after 24 hours that any increase of colonies appeared in the bouillon.

II. The influence of acidification, such as may occur in milk from the presence of atmospheric germs, was studied. To exclude germs and to simplify the experiment known quantities of lactic acid were added to sterilized milk such as was used in all the experiments.

This milk was infected with *B. typhosus* and poured into separate tubes to which increasing amounts of lactic acid were added. The colonies were counted after one hour's contact at a temperature of 20° C.

No.	Lactic Acid.	Colonies per cc.
Control	None	10,000
1	$\frac{1}{2000}$	10,000
2	$\frac{1}{1000}$	10,000
3	$\frac{1}{400}$	10,000
4	$\frac{1}{200}$	9,000
5	$\frac{1}{120}$	8,500
6	$\frac{1}{50}$	150
7	$\frac{1}{20}$	80

Thus we see that when the dose of lactic acid is greater than 1 : 400 the acid inhibits the growth of *B. typhosus*. These results may be compared with those obtained with hydrochloric acid which is reported to kill the bacillus in similar strength.

III. Coagulation produced by rennet does not arrest the growth of *B. typhosus*. This the authors have shown by submitting several specimens of milk, previously infected with the bacillus, to rapid coagulation, obtained in 10 minutes at 40° C. by the addition of a small quantity of rennet. "After an hour, a period during which we had noticed a marked diminution of germs in the case of a similar coagulation with lactic acid which served as a control, we separated aseptically the whey from the clot and carried out a comparative infection." One example is given :—

Control milk without rennet..	..	1,350 col. per cc.
Milk coagulated by rennet		
Coagulum .. ..	..	1,080 " "
Whey .. ..	..	750 " "
Total ..	..	<u>1,830</u>

IV. The removal of the cream and dilution of the milk do not seem to have any influence on the rapid development of *B. typhosus* if the added water is free from germs from outside.

V. "Our results relate only to sterilized milk but may be considered as applicable to ordinary milk. The factors which influence the infection of milk by *B. typhosus* with the rapid development that we have disclosed, depend on the amount of the seed and the degree of neutrality of the milk. These depend in their turn on the foreign germs enclosed in the milk which attack either the lactose with formation of lactic acid, or the casein with production of products of degradation the alkalinity of which reduces the precedent acidity, as we have shown (*Ann. de l'Institut Pasteur*, 1905, Apr.).

"There is further the important factor of vital concurrence ; upon this factor depends, as Duclaux has shown, the predominance or diminution of one of the varieties present."

J. H. T. W.

LEBOEUF (A.), BRAUN (P.) & BOUNAFOUS (J.). i. *Note sur un procédé d'hémoculture en bouillon citraté.*—*Arch. Méd. et Pharm. Milit.* 1916. Apr. Vol. 65. No. 4. pp. 597–600.

- ii. *Action comparée du bacille d'Eberth du Paratyphique B et du Paratyphique A sur les milieux au citrate de soude. (Nouveau procédé de différenciation).*—*Ibid.* pp. 601–603.

These two contributions hang together and will be treated as one. The authors found that methods of blood culture, applicable in times of peace and in well equipped laboratories, must in times of war give way to methods of "necessity." They note that the best method of haemoculture for the "enteric" group of bacilli is that of CONRADIKAYSER based on the triple findings that ox bile: (1) dissolves the red corpuscles; (2) checks coagulation of the blood; and (3) constitutes a good medium for the culture of Eberth's bacillus and the paratyphoid bacilli. It is also thought that the bile impedes the bactericidal action of the serum. Finding that ox bile could not be obtained in quantities sufficient for the work they had to do the authors tried to find a substitute. They note that LAFFORGUE, in order to obtain the same results as those given when bile is used, adds to 10 cc. of blood 0.1 cc. of a 20 per cent. solution of citrate of soda mixing, when centrifuged, 10 cc. of the blood with 50 to 100 cc. of bouillon. Having convinced themselves that a certain amount of citrate of soda in the bouillon did not hinder the growth of the "enteric" group of bacilli and thinking that the bactericidal action of the serum is not so strong as is generally supposed the authors began their experiments. They planted blood directly into citrated bouillon in the following proportions:—

Blood taken from a vein	2 cc.
Normal citrated bouillon	10 cc.
Solution of citrate of soda (10 per cent.) ..	$\frac{1}{2}$ cc.

The bouillon is sterilized after adding the citrate of soda; after which the blood is introduced into the tubes. Typhoid and paratyphoid bacilli grew well in this medium. A series of comparative tests with ox bile were made and the results are given in tabular form.

The only noticeable difference between the results given by the two methods is that growth is slightly slower in the citrated bouillon; one series may be quoted as an example of this feature:—

No.	Date.	In Bile.	In Citrated Bouillon.	Observations.
252	5th Aug.	+ 6th Aug.	+ 11th Aug.	Paratyphoid A
253	"	—	+ 9th "	" A
254	"	+ 6th Aug.	+ 6th "	" B
255	"	+ 6th "	+ 9th "	" B
256	"	+ 6th "	—	Eberth
266	6th Aug.	+ 7th Aug.	+ 14th Aug.	Eberth
293	8th "	+ 9th "	+ 10th "	"

"Examination of this table shows that in the majority of cases there is a delay of 24 hours in the citrated bouillon as compared with the bile; sometimes this delay is more marked (No. 252=5 days, No. 266=7 days).

"The interesting point about this technique is that it allows one to work with a medium of fixed composition, always ready in any quantity and in any place and in which species other than those of the Coli-Eberth group will grow."

While conducting the above experiments the authors noticed that in a certain number of their tubes coagulation occurred. "The coagulum appeared rapidly (24 to 42 hours) in certain cases, more slowly in others." When the tubes were examined those in which the phenomenon occurred were found to contain *B. typhosus* and *B. paratyphosus* B. In no instance was there any coagulation in tubes planted with *B. paratyphosus* A. [In the "table" giving the numerical results of the examination a slip, due to the pen or the printer, has had the result of putting "A" and "B" in the wrong places.] In certain control tubes containing citrated bouillon to which 2 cc. of blood from healthy individuals was added no change took place, no clot was formed. Hundreds of experiments subsequently confirmed these findings.

"We were thus naturally led to think that the Eberth and the Para B must attack the citrate of soda and set free new substances, perhaps capable of acting upon diagnostic bodies."

After trying other tests and colouring matter the authors fixed upon litmus as best serving their purpose. They added litmus to their "citrated bouillon" "so as to obtain in a tube of 20 mm. diameter a light-violet tint." After the addition of the tincture of litmus the bouillon was poured into smaller tubes which were sterilized. These tubes were inoculated with typhoid and paratyphoid bacilli and the results were as follows:—

B. typhosus.—"At the end of 24 hours the colour changed to rose-salmon, then, at the end of from 48 to 72 hours, changing to blue or losing all colour; in the last case (which appeared to us the most frequent) at the end of some days the decolorized medium became blue, the tint commencing to show itself on the surface of the liquid gaining progressively the lower layers (phenomena of oxidation probably)."

B. paratyphosus B. "After 24 hours veering to a dirty grey-rose, then, in one case or another, either turning directly to blue or losing all colour (here decolorization is almost constant); in the latter case at the end of some days the blue tint again appeared passing from the surface to the deeper layers as in the preceding experiment."

B. paratyphosus A. "At the end of 24 hours turning to rose-violet; this colour is preserved indefinitely."

Out of about 800 differentiations only two failed to agree with the above results. These results were not produced where peptonized water with litmus and citrate of soda was used and this fact the authors consider of importance; "it proves in fact, the necessity of the presence of natural albuminoids, not acted upon so as to simplify their molecules, such as are found in beef bouillon."

J. H. T. W.

WALSH (J. H. Tull). *Enteric Fevers in the Tropics: A Point in Nomenclature.* [Correspondence.]—*Lancet*. 1916. July 8. p. 78.

Lt.-Col. Tull Walsh points out that if the "enteric fevers" are grouped under the word "enteric," the bacilli naturally fall into a genus "enterica" with *Enterica typhosa*=*B. typhosus*, *E. mitis*=*B. paratyphosus* A, and *E. icteriformis*=*B. paratyphosus* B." He makes this suggestion with a view to attracting attention to the present unsatisfactory classification of the typhoid fevers and their respective causative agents.

A. G. B.

RATHERY (F.) & MICHEL (R.). *Vaccinothérapie dans la fièvre paratyphoïde B.*—*Bull. et Mém. Soc. Méd. des Hôpît. de Paris.* 1916. Apr. 20. 3 ser. Vol. 32. No. 13-14. pp. 485-507. With 21 charts and 4 diagrams.

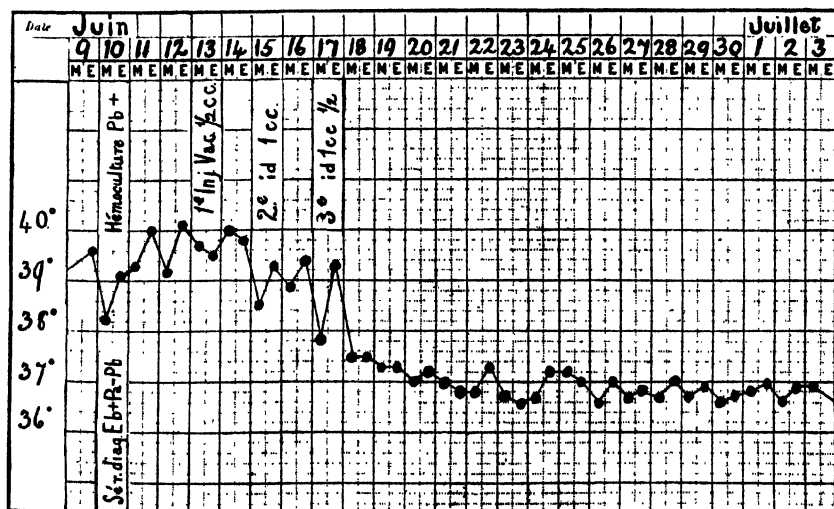
During the years of the war the authors have treated hundreds of cases of paratyphoid B fever. From the 1st December 1914 to the 14th April 1915, 693 cases passed through the Paris hospitals with which they are connected. These patients were treated in the usual manner with drugs, baths and sponging. The death-rate amounted to 8.80 per cent. and the epidemic was at its worst. From the 14th April 1915 to the 20th January 1916 their patients were treated with a paratyphoid B vaccine :—

Cases treated with " vaccine "	..	..	147
Died	..	..	5
Mortality	..	..	3.40 per cent.
Cases not treated with " vaccine "	..	..	279
Died	..	..	6
Mortality	..	..	2.15 per cent.

As explaining the low death-rate among the latter group the authors write :—" Towards the end of the epidemic we often observed cases of very mild type, severe cases were rare."

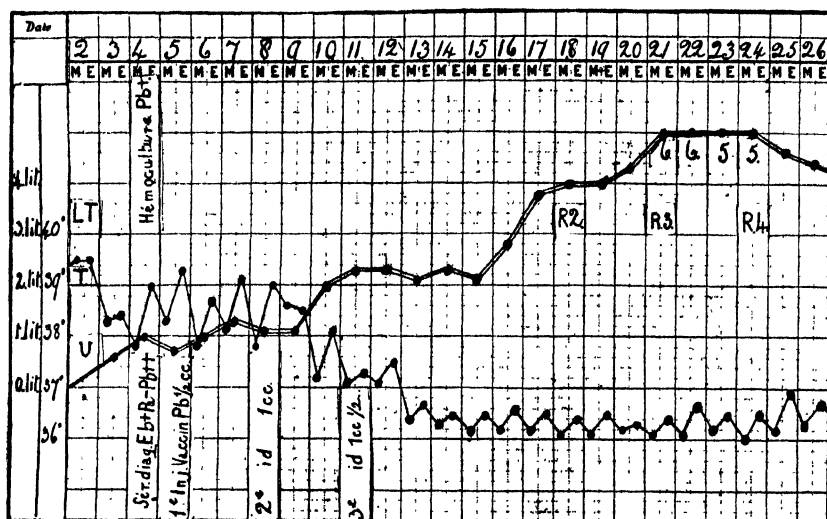
Mild cases were not treated with vaccine and others excluded were :— Cases seen at a late stage of illness ; those extremely feeble, and patients with much hypertrophy of the spleen, with anaemia, or coma. Cases with albuminuria or hyperpyrexia were not necessarily excluded. The results, as shown by the numerous charts, were good. The three charts given below are typical of the great majority.

CHART I.



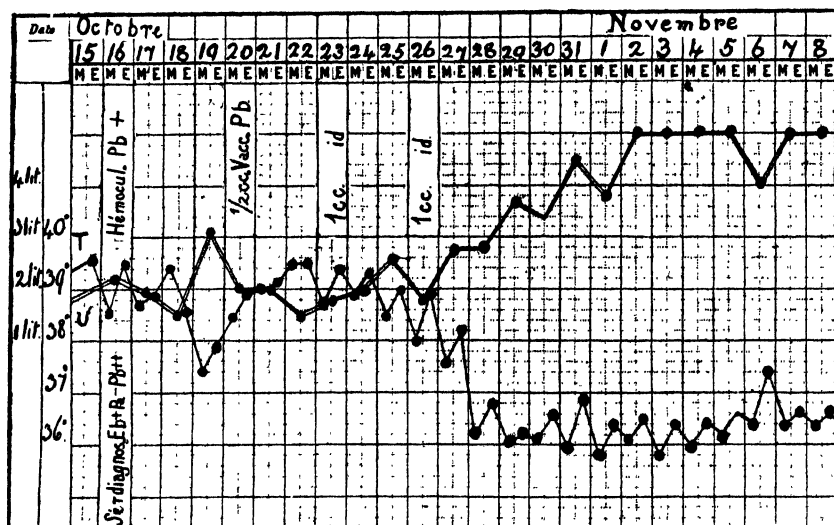
Observation 1. S., vaccinated four times against typhoid.
(C278)

CHART II.



Observation 2. E., vaccinated four times against typhoid.

CHART III

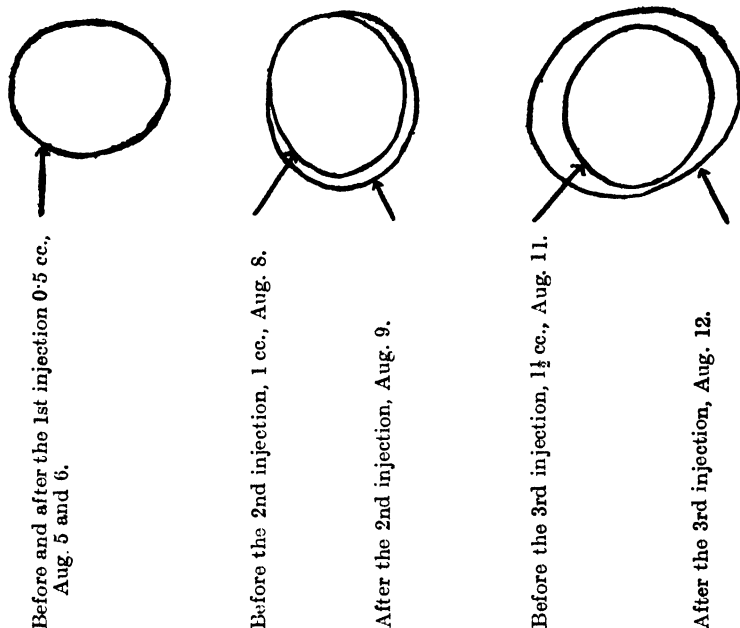


Observation 3. K., vaccinated once against typhoid.

Two of these charts show plainly the increased secretion of urine during "lysis" and convalescence.

It is of course well-known that the toxins formed by the "enterica" group of bacilli cause engorgement of the spleen, sometimes inflammatory and even followed by fibrotic hypertrophy. The authors

observed and noted the fact that the vaccine inoculations produced a rapid, more or less temporary, enlargement of the spleen. One of their diagrams is copied as an example of the phenomenon :—



It was noticed, as in the above case, that occasionally the first, and, generally small dose of vaccine, did not produce any measurable engorgement.

In a small number of cases the opsonic index was tested. The authors' conclusions in this matter are :—"In paratyphoid as in typhoid the opsonic index is relatively raised during the course of the disease ; if a first inoculation clearly lowers the 'index' with a rise after the second inoculation it is wise to continue the vaccino-therapy."

J. H. T. W.

BOURGES (HENRI). **Syndrome anémique intense, brutal et passager, consécutif à une inoculation vaccinale antityphique chez un anclen paludéen.**—*Bull. Gen. de Thérap.* 1916. Apr. Year 85. Vol. 168. No. 20. pp. 838-843.

The case here recorded is that of a French sailor with a history of previous attacks of malarial fever. In 1907 he was in good health but during that year, while at Colon, he became infected with the malarial plasmodium. In 1910 he not only suffered from malarial fever but developed a large abscess in the liver for which an operation was performed at Havre. During 1911 the man had another attack of malarial fever. He recovered and was apparently in good health when, on the 14th August, 1915, he received an inoculation of anti-typhoid vaccine, amount not stated. During the night following there occurred a severe rigor, with high temperature, followed by profuse sweating. On the 16th the temperature was normal, but the sailor

was so pale and weak that he was at once removed to the marine hospital. The lungs appeared normal as was the heart except for some tachycardia. Pulse, 100; temperature, 36.2° C.; spleen and liver enlarged; urine free from sugar, albumin and bile salts. Any exertion caused dyspnoea and vertigo. A blood count showed:—

Red corpuscles	..	..	..	..	1,800,000
White „	..	..	..	..	17,000
Haemoglobin	..	..	..	..	3.5 per cent.

The condition of the patient remained much as described up to August 25th when some improvement was noticed. Organs apparently free from disease. Pulse, 80; temperature, 36.8° C. Blood count August 27th:—

Red corpuscles	..	..	..	..	2,692,000
White „	..	..	..	..	15,000
Haemoglobin	..	..	..	..	5.5 per cent.

The nucleated red cells, very numerous on August 16th, were no longer visible. By September the 10th the man was much better, colour had returned to the face and the liver was normal in size. Blood count September 24th:—

Red corpuscles	..	..	..	..	3,990,000
White „	..	..	..	..	9,300
Haemoglobin	..	..	..	..	9 per cent.

Spleen normal in size.

On September the 25th the man left hospital on sick leave.

[We must presume that malarial parasites were not found; the attack during the night of August 14–15 was not unlike an attack of ague. It is, however, more probable that the sudden septic poisoning had its origin in slumbering bacillary embers enclosed in the area formerly occupied by the liver abscess.]

That previous attacks of malarial fever do not, as such, increase the possible danger of antityphoid vaccination appears to be proved by the absence of untoward effects following upon the vaccination of thousands of soldiers, British and Indian, sent from the Indian Empire to confront the enemy in various parts of the world.]

J. H. T. W.

AMOEBIASIS AND DYSENTERY.

AMOEBIASIS.

RAVAUT (Paul) & KROLUNITSKI (G.). **Pourquoi avons-nous failli méconnaître la dysenterie amibienne ?**—*Presse Méd.* 1916. Apr. Vol. 24. No. 22. pp. 169–172. With 2 text-figs.

This article consists largely of a reiteration of the authors' views previously expressed in other papers. One of the chief points is that *B. dysenteriae* may often be found in the stools of patients suffering from amoebic dysentery and in that case it always plays a secondary role and may even be saprophytic. If *B. dysenteriae* is isolated from the faeces, and the patient's blood agglutinates this organism, it does not necessarily follow that it is the cause of the illness. Very often *E. histolytica* is the real cause and this should always be suspected where anti-dysentery serum fails.

There are now many cases on record of amoebic dysentery being contracted in France by soldiers who have been in contact with colonial troops or their own countrymen, who have been abroad.

A somewhat detailed account is given of the morphology of *E. histolytica* together with the points of difference between it and *E. coli*.

E. E. A.

ORTICONI (A.) & AMEUILLE (P.). **Sur la dysenterie amibienne autochtone.**—*Bull. Acad. Méd.* 1916. Apr. 4. Vol. 75. 3rd ser. pp. 390–392.

Of 28 cases of dysentery examined, 11 were amoebic. Three had lived in the colonies where they had had intestinal trouble, but eight had never been out of France. Five of these cases belonged to the metropolitan infantry, and the infection seems to have come from trenches and quarters previously occupied by colonial troops. For microscopical investigation absolutely fresh faeces are essential. Amoebic dysentery appears to have taken its place in the pathology of temperate climates. After the war we may expect to find the disease not only amongst soldiers returned from the front but also amongst the civil population.

E. E. A.

WORSTER-DROUGHT (C.) & ROSEWARNE (D. D.). **Amoebic Dysentery in a Man who had never left England.**—*Brit. Med. Jl.* 1916. May 20. pp. 715–716.

An account of a soldier who developed dysentery with blood and mucus in the motions, although he had never left England. Active forms of *E. histolytica* were found in the stools. Treated with emetine this man completely recovered. No cysts were seen up to three weeks after his recovery. Several of his companions had been abroad but could not be proved to be infectious. The patient's serum gave no agglutination with Shiga or Y bacilli.

E. E. A.

NOC (F.). *Parasitisme intestinal en Cochinchine. (Diagnostic de l'amibiase intestinale chronique).*—*Bull. Soc. Path. Exot.* 1916. Mar. Vol. 9. No. 3. pp. 125–126.

In chronic amoebic dysentery the cysts may be difficult to find. Many cases are returned negative from insufficient time being spent over the examination, or an adequate number of examinations has not been carried out. To facilitate the search Noc has introduced the following procedure :—

1. Rectal wash of 500 cc. of boiled water.
2. Then a wash or instillation (lasting about 30 minutes) of the following solution :—

Thymol	0.5 gram.
Boiled water	1000 cc.

This treatment usually brings away a certain amount of mucus in which it is easy to demonstrate active forms of *E. histolytica*. It also has the additional advantage that it is directed against the nematode worm *Trichocephalus*. This worm has the same habitat as the amoebae and by its irritation of the intestinal mucosa may assist them to pass through the wall of the gut, so that it is very desirable to get rid of it.

E. E. A.

THOMSON (J. Gordon) & THOMSON (D.). *Some Observations on the Effect of Emetine Administration on the Free Vegetative Forms and Cysts of Entamoeba histolytica and Entamoeba coli.*—*Jl. Roy. Army Med. Corps.* 1916. June. Vol. 26. No. 6. pp. 683–694. With 1 plate.

In a series of 143 cases of definite amoebic dysentery, the typical four-nucleate cysts of *Entamoeba histolytica* were found in only 11 cases, and then only in small numbers. Cysts were not found during an acute attack of the disease. The morphology, more particularly the formation of cysts, of *E. histolytica* and *E. coli* is described.

The authors state that if a patient be treated with half-grain doses of emetine administered hypodermically twice daily until at least seven grains have been given, then neither *Entamoebae* nor cysts could be found in the faeces. Four cases of cyst carriers were observed and treated. Magnesium sulphate was given regularly at the same time in order to expel the cysts from the bowels. Cysts of *E. histolytica* were kept for sixteen days in a test-tube in a mass of solid moist faeces. Cysts of *E. coli*, kept similarly, were found to be in good preservation after a week. Cysts seemed to disappear sooner from very fluid stools. The authors briefly discuss the methods of infection in amoebic dysentery.

Their conclusions are as follows :—

“(1) If an amoebic case receive a continuous course of treatment with emetine of not less than a total of seven to ten grains of the drug administered in grain doses daily for a week, it is probable that he will never become a carrier of cysts. In order, however, to make certain of this, it is better to carry the treatment further. Such treatment also prevents relapses.

“(2) Cysts of *E. histolytica* can be cleared out of a patient after six grains of emetine, but, to make absolutely certain of this, it is better to exceed this dose. This treatment must be combined with saline purgatives, so as to get free daily action of the bowels.

"(3) A case of amoebic dysentery inefficiently treated with less than seven grains of emetine is likely to become highly dangerous as a carrier of cysts. One or two small doses may act beneficially and get rid of active symptoms, such as the passage of blood and mucus, but it may at the same time stimulate the formation of large numbers of cysts. The cessation of treatment on the disappearance of active symptoms is fraught with danger, both to the patient and, subsequently, to others.

"(4) All patients known to have blood and mucus in their stools and to have received less than an efficient total quantity of emetine ought to be examined for the presence of cysts in the faeces, as it is highly probable they have thereby become dangerous carriers.

"(5) The transmission of amoebic dysentery is undoubtedly due to the ingestion of cysts. This is brought about by the contamination of food, fingers, or flies. Cysts may also be carried along with sand particles by wind.

"(6) The powers of resistance of cysts outside the body are considerable, and this should be borne in mind by all responsible for sanitary prophylactic measures against dysentery."

H. B. F.

NOC (F.). *Amibiase intestinale, émétine, novarsénobenzol.*—*Bull. Soc. Path. Exot.* 1916. May. Vol. 9. No. 5. pp. 325-340.

Salvarsan is not the veritable specific for chronic amoebic dysentery that some authors have claimed it to be. It is most effective in combating infections of recent date. Against resistant strains of *E. histolytica* it is of little use. Given in conjunction with emetine its tonic action on the system may be quite beneficial, but it is a mistake to think it can replace this drug.

E. E. A.

VALENCIA (M. A.). *Tratamiento de la disenteria amibiana con neosalvarsan.* [Treatment of Amoebic Dysentery with Neosalvarsan.]—*Repert. de Med. y Cirug.* 1916. Mar. Vol. 7. No. 6. (No. 78). pp. 260-262.

Notes of the case of a man suffering from amoebic dysentery who had received 40 doses of emetine without much benefit, the quantities having been insufficient and the administration irregular. The patient, believing that his ailment was due to syphilis, applied to the author for treatment with neosalvarsan. A dose of 45 centigrammes was given, with the result that, the same night, the patient slept for six hours without waking, although, as a rule, he had from 8 to 10 motions in the course of a night. The appetite and general condition began at once to improve, and six days afterwards a second injection of 60 centigrammes was given. The stools were then reduced to two only in the 24 hours. The patient would not continue the treatment longer, believing himself cured. The author, however, met him afterwards in the street, and ascertained that he continued in a fairly good state of health. The case is reported as an encouragement to other practitioners.

J. B. N.

ALLAN (William). *Clinical Notes on the Use of Alcresta Ipecac in Amebic Dysentery.*—*Amer. Jl. Trop. Dis. & Prevent. Med.* 1916. May. Vol. 3. No. 11. pp. 602-606.

It would be much more convenient if instead of injections of emetine, we could administer the drug by the mouth with equal efficacy, in

cases of amoebic dysentery. This would free the patient from the necessity of coming to the physician for each dose, as well as from the discomfort often arising upon repeated subcutaneous or intramuscular injections. A preparation has been placed on the American market named "Alcresta Ipecac Tablets," which consists of ipecac alkaloids compounded with hydrated aluminium silicate (Fuller's earth). As the result of observations on 10 cases the author declares that the results are unsatisfactory on account of the variation in absorption from the intestinal tract and he winds up by saying that emetine given hypodermically is twice as efficacious as emetine given in the form of Alcresta tablets.

E. E. A.

NIXON (P. I.). Chaparro amargosa in the Treatment of Amebic Dysentery.—*Jl. Amer. Med. Assoc.* 1916. Mar. 25. Vol. 66. No. 13. p. 946.

In previous communications the author has advocated the use of fresh infusions of Chaparro amargosa by the mouth for amoebic dysentery [see this *Bulletin*, Vol. 6, p. 51]. Several authors have experienced failure with emetine in a small residuum of cases. Nixon has found such cases yield to the treatment with the drug under notice. The present communication deals with such a case. Emetine was given in half grain doses subcutaneously every day for over four months. After an interval of two months, one grain of emetine was injected every other day for 40 days. This treatment did not kill the amoebae, for active forms were found in a stool consisting almost entirely of blood and tenacious mucus. After a preliminary dose of Epsom salts a glass of fresh infusion of Chaparro amargosa was given by the mouth four times daily, and a quart of the same infusion was put into the rectum. Improvement was only slight. With the object of getting rid of the tenacious mucus a preliminary rectal irrigation of sodium bicarbonate, 1 oz. to the quart was tried before the infusion. The patient soon got well with this treatment.

E. E. A.

DOPTER (Ch.). Action de l'émétine dans le traitement des abcès amibiens du foie.—*Paris Méd.* 1916. Mar. 4. Vol. 6. No. 10. pp. 243-252. With 4 text-figs and 1 chart.

The author has recently treated 11 cases of liver abscess due to *E. histolytica* with emetine. A litre of chocolate-coloured pus was evacuated from the first case on opening the abscess. Emetine was injected the same day. The discharge of pus rapidly ceased, losing the brownish colour almost immediately. This is very different to what is seen in cases not treated with emetine where the discharge of pus often drags on for several weeks. In another case the abscess discharged itself by bursting into the bronchi. Emetine produced a speedy recovery in 12 days. From another abscess 500 cc. pus were removed by aspiration, no operation being performed. Emetine injections produced a similar good result. Washing out the abscess cavity with a solution containing emetine, as recommended by ROGERS, is not necessary.

It is important to know whether emetine alone, without an operation, will effect a cure. A case of liver abscess was put on emetine. There was some improvement, but the liver still remained large and it became necessary to evacuate. On aspirating, 300 cc. pus were obtained which was greyish not chocolate in colour. In the second case eight punctures were negative as regards pus. The patient was put on 1·2 grs. emetine daily for 12 days. The temperature returned to normal in five days, the hepatic pain diminished, and the liver became smaller. Suddenly the patient brought up thick pus, grey at first, then green. Complete recovery ensued. Dopter is convinced that evacuation of these abscesses is absolutely necessary. The emetine converts the abscess into a "dead" one, that is to say it kills the amoeba and prevents the further production of pus, but is powerless to effect the absorption of the pus already formed. A few cases in which emetine was not successful are cited.

E. E. A.

DUGGAN (C. W.). **Osmosis in the Treatment of Tropical Abscess of Liver.** [Correspondence.]—*Jl. Roy. Army Med. Corps.* 1916. June. Vol. 26. No. 6. p. 824.

A note suggesting the following treatment of tropical liver abscess. After evacuation the cavity is washed out night and morning with 2 or 3 drachms of 10 per cent. ichthyol in glycerine. [Most authors consider evacuation combined with subcutaneous injections of emetine to be sufficient treatment.]

E. E. A.

RATHERY (F.) & BISCH (L.). **Abcès du foie et diarrhée des tranchées.**—*Bull. Acad. Méd.* 1916. Apr. 4. Vol. 80. No. 14. pp. 388-389.

The disease known as "trench diarrhoea" is mostly of dysenteric origin as is proved by the fact that some of the patients develop liver abscess. The authors record four such cases, in which the clinical picture was that of ordinary dysenteric colitis that had persisted for two to four months. Operation cured the patients. Although ill for a few months they had continued to inhabit the trenches, suffering only from rather frequent slimy stools. Amoebae were not found in the faeces of these patients.

E. E. A.

THOMSON (J. Gordon) & THOMSON (D.). **Memorandum on the Prevention of Amoebic Dysentery.**—*Brit. Med. Jl.* 1916. June 24. pp. 881-882.

It is very important to give every case of amoebic dysentery a thorough course of emetine, to prevent the patient becoming a carrier. Short courses, such as grain doses daily for four days, benefit the patient's condition at the time but are dangerous as they often leave him a cyst carrier. He is then a potential source of infection, and may himself at any time develop a liver abscess. Daily grain doses should be given until 7 or 10 or even 20 grains have been taken. It is most important that there should be no intermissions; missing a day or two here and there must be strenuously avoided. In the case of cyst

carriers 12 grs. at least should be given. They can usually be cured by giving magnesium sulphate in 2 drachm doses every four hours in conjunction with emetine.

The authors state they have found that flies can become infected with *E. histolytica* cysts, and deposit them in their faeces on food. The cysts can live for considerably over a month in faeces which are not allowed to dry. In faeces well diluted with fresh drinking water they persist for weeks. There is a special danger in Egypt from the natives' habit of depositing faeces in the open, on sand. Flies, water, and wind may aid in the spread of the infection.

A number of common-sense recommendations are submitted, based on the foregoing facts :—

1. *Thorough and Rapid Disposal of Faeces.* Either fly-proof latrines or kerosene in the buckets should be provided. Kerosene keeps flies at a distance and being inflammable assists in the incineration of the faeces later on.

2. *Thorough and Rapid Disposal of Horse Dung and Refuse.* Flies breed in manure, so this should not be allowed to lie.

3. *Separation of Camps from Native Quarters and Horse Lines.*

4. *Careful Guard of all Water Supplies.*

5. *Fly-screening and Destruction of Flies.* Especially in messes, canteens and cook-houses.

6. *Supply of Sterile Sand for Cleaning Mess Tins.* This is on account of the great liability of sand to be contaminated by the deposit of faeces.

7. *Eating and Drinking in Native Quarters.* No raw food should be eaten since the natives live under such unhygienic conditions. All water and milk should be boiled.

8. *Recommendations with regard to Hospitals.*

9. *Early Thorough Emetine Treatment.* This is administered on the lines indicated above.

10. *Microscopic Examination of Faeces before Discharge.* Patients should not be discharged for duty until free from infection.

11. *Isolation and Thorough Treatment of Cyst Carriers.*

12. *Examination of all Cooks and Mess-Room Orderlies.* No soldier should be employed as a cook or mess-room orderly in a camp or hospital until it has been proved by microscopic examination that he is not a cyst carrier.

13. *Larger Sanitary Staff and Equipment.* If larger sanitary squads and equipment could be provided, these measures could be carried out, and the disease would rapidly disappear from our army. The extra expense would be repaid almost immediately.

E. E. A.

PENFOLD (W. J.), WOODCOCK (H. M.) & DREW (A. H.). **The Excystation of *Entamoeba histolytica* (tetragena) as an Indication of the Vitality of the Cysts.**—*Brit. Med. Jl.* 1916. May 20. pp. 714–715. With 8 figs.

Kittens were found by feeding to be refractory to cysts of *Entamoeba histolytica*, only one out of twelve becoming infected in three weeks. Hence the authors tried to cultivate the cysts. "A sample of faeces containing a good infection with cysts is well emulsified with saline

(or water) and filtered through three or four layers of fine gauze, to remove the larger faecal particles. The filtrate is then centrifugalized and the deposit washed three or four times, the supernatant liquid, which contains large numbers of bacteria but no cysts, being pipetted off each time. By this means toxic products are removed, and the cysts are concentrated in a mass of fine faecal debris."

Pancreatic extract was found to be the only successful agent in producing excystation. The authors' method is thus described:—"A mixture is made up in the following proportions: Nutrient broth five parts, liquor pancreaticus two (or three), cyst-containing sediment one part. This mixture is then incubated for five to seven hours at 37° C. At the same time a drop of the mixture is placed on a slide, covered, and the cover-slip ringed to prevent evaporation; this is also incubated. This observation-preparation serves as a control to the tube and can be taken out and rapidly examined whenever desired, to ascertain how excystation is progressing; after five or six hours excystation is usually taking place." During the process, the protoplasm slightly retracts from the cyst membrane and becomes somewhat amoeboid. Dissolution of the membrane occurs over a small area. A small, mainly ectoplasmic protuberance of the amoeba is thrust through the aperture. The process of emergence may take only 10 minutes or it may take longer. The authors do not consider that a division into four amoebulae takes place, as a rule, within the cyst. Chromidial blocks may or may not be seen in excysted amoebae.

Subcultures were made from excysted amoebae in "the expression-liquid of blood-agar tubes, to which either two parts of citrated blood or equal parts of citrated blood and fresh serum were added. These new tubes were then placed in a vacuum and incubated at 37° C. At from eighteen to twenty hours after the excystation period we have seen both small and moderate-sized active *histolytica* forms in these cultures, a few of the larger individuals containing red blood cells." It is doubtful whether multiplication had occurred therein. The cultures became overgrown with bacteria.

The method outlined above fails with *Entamoeba coli* and with *Lambia intestinalis*. The authors think that conjugation occurs within *Lambia* cysts.

Experiments on the vitality of the cysts of *Entamoeba histolytica* were interrupted. Cysts were kept in slowly running water for fifteen days, and some were found to be alive at the end of this period. Water contaminated with cyst-containing faeces may remain a source of infection for a long time.

H. B. F.

JOB (E.) & HIRTZMANN (L.). Le cycle évolutif de l'Amibe dysentérique.
—*C. R. Soc. Biol.* 1916. May 20. Vol. 79. No. 10. pp. 421-424.
With 13 figs.

The observations were made on stools of patients suffering from amoebic dysentery in Morocco. The authors think that in the life-cycle of the amoeba of dysentery—called by them *Amoeba dysenteriae*—there is multiple schizogony and sporogony (involving sexual reproduction) as well as binary fission.

The schizonts are said to measure 8μ to 9μ , and to contain a variable number of chromatinic granules. When these granules become very small the parent cytoplasm segregates around each of them, forming a morula stage. The daughter organisms, thus formed, when free measure 2μ to 4μ .

In sporogony a uninucleate form is said to undergo peripheral nuclear reduction by budding, and thus to lead to the typical *Entamoeba histolytica* (or *A. dysenteriae* of the authors), which is thought to be a mature female gamete.

Other amoebae, in which nuclei of different types were present, have been observed, but no conjugation was seen. It is thought that further nuclear reduction occurs before the typical four-nucleate cystic stage is reached. Stages of schizogony and of sporogony are illustrated in the text-figures.

[Some of the authors' figures are somewhat reminiscent of Noc's *Entamoeba* and the early figures of GRASSI.]

H. B. F.

- i. WARD (A. B.), COLES (A. E.) & FRIEL (A. R.), **Infectious Jaundice.**—*Brit. Med. J.* 1916. Apr. 8. p. 526.
- ii. FANTHAM (H. B.). **Amoebae in Urine in a Case of Infectious Jaundice.**—*Ibid.* Apr. 15. pp. 553-554.

i. Under this heading the authors draw attention to some peculiar bodies seen in the urine of a case of jaundice with albuminuria at Mudros. Under a low power yellow-greenish bodies were seen, circular or pear-shaped in outline and of markedly granular appearance. Under a sixth the nucleus was easily seen. The bodies varied from 8 to 33μ in diameter, averaging 20 to 25μ . The protrusion of a pseudopodium could be observed. No cystic forms were seen. The authors have named the organism provisionally *Amoeba urinae granulata*.

ii. Dr. Fantham draws attention to the organism named *Amoeba urogenitalis* (BAELZ 1883) and similar cases reported since by JUERGENS, KARTULIS, POSNER and others. He suggests that the authors' provisional name seems hardly necessary.

A. G. B.

- MENDEL (Joseph). **Les Amibes de la bouche, à l'état normal et pathologique.**—*C. R. Soc. Biol.* 1916. May 6. Vol. 79. No. 9. pp. 393-394.

Entamoeba buccalis and *E. tetragena* [such are the species names used] are considered by the author to be closely allied morphologically. He remarks that only CHIAVARO has seen cysts of *E. buccalis*. The author wonders whether there is any genetic relation between the two amoebae. He had 147 cases showing amoebae in the mouth, both normal and pathological. He found 85 per cent. of his patients were infected. Of these 55 per cent. were rich in amoebae. Among 36 children examined, 22 per cent. were infected. He notes that the toothbrush is useful in eliminating amoebae from the mouth.

Amoebiasis of the mouth was found to coincide almost always with a condition of hyperleucocytosis of the gingival exudate. Of 40 cases of pyorrhoea alveolaris, 38 showed amoebae, often in considerable numbers, and the amoebae were of the same kind as those found in

normal mouths. Chronic cases of certain alveolar abscesses, some cases of gingivostomatitis, and certain infections of the wisdom teeth always showed the presence of amoebae, but the parasites were absent from acute cases of these diseases. Amoebae were found in the mouths of patients having carious teeth, but the parasites were not found in the carious cavities, except in a single case where the cavity was large, contained food detritus and was continuous with the buccal cavity. However, in 15 cases of dental caries examined no amoebae were observed.

The author believes that oral entamoebae exercise no influence on the production of dental caries.

H. B. F.

BACILLARY DYSENTERY.

BERTILLON (Georges). *Une épidémie de dysenterie hémorrhagique dans un escadron de dragons.*—*Ann. Inst. Pasteur.* 1916. Mar. Vol. 30. No. 3. pp. 141-144.

d'HÉRÉLLE (F.). *Sur un bacille dysentérique atypique.*—*Ibid.* pp. 145-147.

These two papers form a clinical and bacteriological account, respectively, of a small epidemic of dysentery caused by an atypical dysentery bacillus. A dozen cases were affected, 10 of which were soldiers. The usual blood and slime was present in the stools. The only fatal case was a girl of 14 years. Neither anti-dysentery serum nor emetine gave good results. It was only possible to treat one of the patients with an autogenous vaccine. He was injected on three successive days and apparently benefitted by the inoculations. Flies seem to have been responsible for the spread of the disease. The latrines had been dug at a distance of 20 meters from the kitchens. Many flies passed directly from the dejecta to the food. As soon as the latrines were established at a greater distance, the epidemic ceased. The faeces of five of the patients were examined; from each of which a type of dysentery bacillus was isolated different from any hitherto described. This organism was not agglutinated by a Shiga or Flexner serum, nor by a polyvalent serum made from Shiga, Flexner and Hiss strains. The serum of one of the patients at the beginning of convalescence did not agglutinate the bacillus. Its fermentation reactions are compared with those of its congeners in the following table:—

	Shiga.	Flexner.	Hiss.	Strong.	Gay.	d'Hérèlle.
Indol	—	+	+	?	?	—
Lactose	—	—	—	—	—	—
Glucose	+	+	+	+	+	+
Mannite	—	+	+	+	+	+
Maltose	—	+	—	—	+	+
Saccharose	—	+	—	+	+	—
Agglut. Shiga serum	+	—	—	—	—	—
„ Flexner „	—	+	+	—	+	—
„ Hiss „	—	+	+	—	+	—
Pathogenic for animals	+	—	—	?	?	+

E. E. A.

BRUENAUER (Stefan Robert). *Ueber Allgemeininfektion mit Dysenteriebazillen.* [General Infection with Dysentery Bacilli.]—*Wien. Klin. Woch.* 1916. Feb. 3. Vol. 29. No. 5. pp. 128-130.

The clinical diagnosis of dysentery is considerably in advance of the bacteriological; of 849 cases of dysentery, only 54 were confirmed bacteriologically. This is much more in evidence than in the case of the typhoids and cholera. Of the causes brought forward to account for it, intermittent excretion of the bacilli in the faeces is the most important. Typhoid and paratyphoid bacilli are often found in the blood and occasionally in the urine, which lends an additional aid to diagnosis, but these findings are rare in dysentery.

Five cases are instanced. In two of them, which were typical dysentery, *B. dysenteriae* Flexner-Y was found in the urines. Cultures of the urine and faeces proved positive in another case, in which *B. paratyphosus* A was also isolated from the faeces. From the urine of a fourth case, a convalescent typhoid, the same organism was again recovered. Lastly *B. dysenteriae* Y was cultivated from the blood of a typhoid patient. In this instance, as is the rule in such cases of mixed infection, the clinical picture was that of typhoid fever.

E. E. A.

SELIGMANN (E.). *Zur Bakteriologie der Ruhr im Kriege.* [Bacteriology of Dysentery in the War.]—*München. Med. Woch.* 1916. Jan. 11. Vol. 63. No. 2. p. 68.

In a previous investigation, the results of the bacteriological examinations of the stools of dysentery and similar diseases were not satisfactory on account of the small percentage of positive findings. Since then the author has had the opportunity of examining cases early in the course of the disease. The cases were severe, mild and convalescent. Where possible particles of mucus were separated from the stools, thoroughly washed in salt solution, and spread over the surface of plates. *B. dysenteriae* Shiga was isolated in 38 per cent. of all the cases, the Flexner-Y type not being found. Of these positive findings:—

70 per cent. were found in the 1st week of the disease.							
53	"	"	"	"	2nd	"	"
18	"	"	"	"	3rd	"	"
0	"	"	"	"	4th	"	"

In a footnote it is stated that during a subsequent more extensive examination of convalescents a few cases were discovered harbouring the bacillus for a longer period.

From 30 per cent. of the autopsies Shiga was recovered, chiefly from the large intestine, but once from the small gut and twice from the stomach. In both of the last two cases gastritis was present, while one of the men had vomited blood. Dysentery bacilli could not be cultivated from the blood in any of the cases in which it was tried.

E. E. A.

VERZÁR (Fritz) & WESZECZKY (Oscar). *Ueber Bazillenträger bei Flexner-Dysenterie.* [Dysentery (Flexner) Carriers.]—*München. Med. Woch.* 1916. Feb. 22. Vol. 63. No. 8. pp. 291-292.

Among 417 cases of convalescent dysentery 77 carriers were discovered, of which 75 were due to *B. dysenteriae* Flexner. The faeces of these cases were not examined in the acute stage, and it is therefore likely that some of the diagnoses were incorrect, which would give a larger proportion of carriers still. From this it will be seen that Flexner carriers are quite common.

In an establishment containing 500 convalescents from various diseases, a small epidemic of dysentery arose comprising six cases, from three of which *B. dysenteriae* Flexner was obtained. As there were no cases in the town and the soldiers were completely isolated from the civil population, an examination of all the dysentery convalescents was undertaken with the result that three Flexner carriers were discovered. In addition all the soldiers who had come from the fighting line immediately before the first cases made their appearance were submitted to a similar investigation, one carrier being found. The interesting fact was now elicited that two of the acute cases had lain in beds adjacent to dysentery carriers. Two of the carriers were free from bacilli in about a couple of weeks (four negative examinations of the faeces). These were probably not carriers in the true sense, but more probably recently infected persons in whom the voiding of bacilli was only a passing event. The other two were much more persistent, one of them being a carrier for at least seven months after his attack of dysentery. This man seems to have been the source of the epidemic since the cases occurred soon after his arrival, while his isolation put an end to the epidemic. The authors draw attention to the intermittent passing of bacilli in the faeces. They have often had a positive finding after two negatives at intervals of at least five days.

E. E. A.

TEN BROECK (Carl) & NORBURY (Franz Garm). *B. dysenteriae as a Cause of Infectious Diarrhea in Infants.*—*Boston Med. & Surg. Jl.* 1916. June 1. Vol. 174. No. 22. pp. 785-788.

The stools of 75 infants with infectious diarrhoea were examined, from 51 of which dysentery bacilli of the mannite-fermenting type (Flexner-Y) were isolated. In five cases bacilli could only be obtained from the faeces at the autopsy. Even in typical cases of dysenteric diarrhoea the bacillus may be difficult to isolate as the following table shows :—

Examination at which <i>B. dysenteriae</i> was detected.	No. of cases.
1st	30
2nd	12
3rd	5
4th or subsequent	4
Autopsy, not during life	5

Positive agglutinations were obtained with several sera of infants whose stools did not show dysentery bacilli. Although the authors have previously found that the sugar fermentation reactions are not constant with the exception of glucose and mannite, they tested their strains and found 76 per cent. belonged to the Y group, 13 per cent. to the Flexner group, and 10 per cent. to the Strong group.

Morgan's bacillus No. 1 was present in the faeces of one case, but the patient's serum did not agglutinate this organism (1 : 20 dilution) though it did agglutinate dysentery bacilli (1 : 320 dilution).

E. E. A.

van POOLE (G. M.). An Epidemic of Dysentery at Fort Shafter, Hawaii, with Three Cases of the Hiss-Russell or "Y" Bacillus Infection.—*Milit. Surgeon.* 1916. May. Vol. 38. No. 5. pp. 525-530.

DELANEY (M. A.). An Epidemic of Bacillary Dysentery due to the Hiss-Russell Bacillus.—*Ibid.* pp. 531-533.

FOUCAR (F. H.). Bacillary Dysentery, Recent Epidemic at Fort Shafter, H. T., from the Laboratory Aspect.—*Ibid.* pp. 534-538.

Three slight contributions dealing with an epidemic of dysentery in the Sandwich Islands, caused by *B. dysenteriae* Y. Several children were attacked with fatal results. Inoculation of the healthy children with a vaccine prepared from the organism isolated completely aborted the epidemic as far as the children were concerned. Adults were not treated with the vaccine and a few cases continued to occur amongst them.

E. E. A.

NÈGRE (L.), SERGENT (Ed.) & FOLEY (H.). Le rôle des bacilles pseudodysentériques dans les affections intestinales en Algérie.—*Bull. Soc. Path. Exot.* 1916. Apr. Vol. 9. No. 4. pp. 204-207.

The authors have isolated organisms, which they call pseudo-dysentery bacilli, from the faeces of patients suffering from diarrhoea, dysenteric or otherwise, in Algeria. The chief characteristics of these bacilli are :—

1. Fermentation of lactose and glucose with acid and gas production.
2. Most of the strains are non-motile.
3. They are not agglutinated by Shiga or Flexner serum. In many cases the patient's serum agglutinated the respective organism in a high dilution.

In two cases the coexistence of *E. histolytica* was noted.

E. E. A.

CHOWANIEC (Wanda). Ein interessanter Fall von Dick- und Dünndarm-dysenterie. [Interesting Case of Dysentery of the Large and Small Intestines.]—*Wien. Klin. Woch.* 1916. May 11. Vol. 29. No. 19. pp. 583-584.

A record of a case of severe clinical dysentery. Bacteriological investigation [? serum agglutination or isolation of bacillus from faeces] was positive for Shiga. Unspecific treatment with animal charcoal, bismuth, tannin intestinal injections was administered.

The case proved fatal, and the autopsy showed dysenteric ulceration of not only the large gut but also the small for a distance of about 30 feet from the ileo-caecal valve. [The administration of anti-dysentery serum in the early stages might have saved this man's life.]

E. E. A.

SCHARF (S.), SOKOLOWSKA (Helene) & GIESZCZYKIEWICZ (Marian). *Ueber die Serumbehandlung der Ruhr*. [Serum Treatment of Dysentery.]—*Med. Klinik*. 1916. Feb. 6. Vol. 12. No. 6. pp. 148-150.

During 1915, 305 cases of dysentery were treated with anti-dysentery serum, for the most part polyvalent, with only six deaths (2 per cent.). Of these fatal cases, however, three had no serum injections because the onset was atypical and the disease not diagnosed until it was too late. The other three died of complications. Only the severe cases got serum. The bacteriological analysis of the cases in one hospital was as follows :—

Shiga	84
Flexner-Y	50
Atypical	2
Not Identified	5
Not Investigated	6
No Pathogenic Bacteria found	58

If one dose of anti-serum does not suffice, it should be repeated daily until a good effect is produced.

E. E. A.

GENEESKUNDIG TIJDSCHRIFT VOOR NEDERLANDSCH-INDIË. 1916. Vol. 56. No. 1. pp. xxxiii-xxxvii.—*Verslag over de antwoorden, ingekomen op de rondvraag, toegezonden aan de leden der Vereniging tot bevordering der Geneeskundige Wetenschappen in Nederl-Indië, omtrent den samenhang van den dood bij lijders aan bacillaire dysenterie in het reconvalescentie-stadium en de toediening van antidysenterieserum*. [Analysis of Replies sent in to the Circular distributed to the Members of the Society for the Promotion of Medical Science in the Dutch Indies, with Regard to the Connection between Death in Patients recovering from Bacillary Dysentery, and the Employment of Anti-dysenteric Serum.]

In response to a Government enquiry as to the occurrence of deaths amongst convalescents from bacillary dysentery who had been treated with antidysenteric serum, the above-named society sent out 500 circulars to its members asking for information on the subject. Only 157 replies were received, of which 116 were simply negative, while 41 entered into details. One member only reported a case of sudden death, eight days after a dose of 50 cc. of Pasteur serum. Several other members, however, reported deaths from heart failure in patients convalescent from dysentery, who had not received any injections of serum. On the whole, it seemed improbable that the use of serum had the drawback alleged, of causing sudden heart failure.

J. B. N.

TEDESKO (Fritz). *Ueber Malloosan bei Dysenterie.* [Malloosan in Dysentery.]—*Wien. Med. Woch.* 1916. Feb. 12. Vol. 66. No. 7. p. 274.

A note advocating the use of malloosan which is a preparation of peat, in cases of bacillary dysentery. It is given in the form of a biscuit or powder. The peat is blended with cocoa to make it more palatable. The action is similar to blood charcoal and like substances, that is to say, it forms a basis for the adsorption of toxins, but it is claimed that peat by virtue of its humic acid is much stronger in this effect. As many as ten biscuits may be given per diem [size or weight not mentioned].

E. E. A.

DEAN (H. R.) & ADAMSON (R. S.). *Preliminary Note on a Method for the Preparation of a Non-Toxic Dysentery Vaccine.*—*Brit. Med. J.* 1916. Apr. 29. pp. 611-614.

Inspired by the good results obtained with eusol by several authors in cases of toxæmia and septicaemia, Dean and Adamson have applied this method to the production of an atoxic *B. dysenteriae* Shiga vaccine. Eusol is a dilute solution of hypochlorous acid, and there is evidence to prove that this substance does not destroy bacterial antigens. Rabbits were first experimented upon. It was found that one in 1,000 eusol was the smallest concentration necessary to render the vaccine atoxic. By treating the bacilli in this manner rabbits could be immunised to withstand something like 10 lethal doses of dead Shiga bacilli. The agglutinins produced by these inoculated animals were decidedly small in amount—in some cases none at all. Similar good results were obtained by using hydrogen peroxide instead of eusol. As the ultimate object of these experiments was the application of the results to protective inoculation in the case of man, the authors proceeded to inject three persons. In each case constitutional symptoms were absent, while the local reaction was a trifle more marked than is usual with a typhoid vaccination. On the strength of these results the authors are led to recommend tentatively a vaccine containing 200 million Shiga bacilli per cc. killed at 58°-60° C. for an hour. This should be mixed with an equal bulk of freshly prepared eusol in normal saline and allowed to stand at room temperature for 24 hours. One cc. of this, which will contain 100 million bacilli in 1 in 1,000 eusol solution, should be injected subcutaneously for the first dose. The second dose given, say, 10 days later might contain 400 million bacilli. A third dose of 200 million or more killed by heat but without the addition of eusol may be required to produce a satisfactory immunity. It is pointed out that the basis of these recommendations is a rather limited number of experiments and further experience may suggest a revision in the direction of increasing the dose of bacilli and perhaps also the amount of eusol in the vaccine. The latter might be expected still further to reduce the tendency of a Shiga vaccine to produce a severe local reaction.

E. E. A.

THOMSON (J. D.). **Attempts to Produce a Safe and Effective Bacillus Dysenteriae (Shiga) Vaccine for Prophylactic Purposes.**—*Brit. Med. Jl.* 1916. Feb. 26. pp. 303-305.

This paper should be read in the original by those whom it concerns. All the experiments were performed on rabbits and therefore one must be guarded in applying the results to man. Local reactions are at a minimum in the case of rabbits, whereas they are a considerable obstacle to the employment of a Shiga vaccine in man, but as the author points out, this applies principally to its prophylactic use; observations on patients suffering from chronic dysentery who have been treated with vaccines, show that in their case the local reaction is quite trifling. It is better to use vaccines in carbolised saline (0·5 per cent. phenol) than those killed by heat. The immunity produced by sensitised and ordinary vaccines was about the same.

E. E. A.

RITCHIE (T. R.). **On the Agglutination Reaction of the Bacilli of the Typhoid-Dysentery Group with Normal Sera.**—*Lancet.* 1916. June 24. pp. 1257-1260.

This is an important paper in view of the number of normal people tested and the care taken to get a homogeneous population, or rather to include only those persons who are most unlikely to have come in contact with the infecting organisms in question. Some 800 sera were collected in Cambridge as follows:

Males.

Cambridge Undergraduates	294
„ Scientific Instrument Company ..	108
„ University Press; and Union Press ..	48
Leys and Perse Schools	33
Cambridgeshire Regiment	28
Various sources	24—535

Females.

Newnham and Girton Colleges	251
Various sources	6—257
Total	792

None of these to their knowledge had suffered from any of the diseases associated with the organisms tested. Foreigners and inoculated persons were excluded.

As regards the technique, the drop method of measurement was employed and each dilution mounted in a flat glass cell. These cells were placed on the top of one another in the incubator (37°) for two hours and then examined with the microscope. Living emulsions of 24 hour agar cultures in normal saline were used. This proved a very rapid method and the author found he could test 130 sera against five different organisms in a day of five hours.

*Results :—**B. Typhosus.***TABLE I.**—Showing Results obtained from the Examination of the Blood of 789 Normal Persons, excluding Medical Students, Laboratory Workers, and Hospital Patients.

—	— in 1-16	+ in 1-16	+ in 1-32	+ in 1-64	Total.
Females	229=89.45%	22=8.59%	5=1.95%	—	256
Males ..	504=94.56%	26=4.87%	2=0.18%	1	533
Total ..	733=92.9%	48=6.08%	7=0.88%	1=0.12%	789

*B. paratyphosus A.***TABLE IV.**—Showing Results obtained from the Examination of the Blood of 792 Normal Persons, excluding Hospital Patients, Medical Students, and Laboratory Workers.

—	— in 1-16	+ in 1-16	+ in 1-32	+ in 1-64	Total.
Females	245=95.33%	12=4.66%	—	—	257
Males ..	525=98.13%	9=1.68%	—	1=0.18%	535
Total ..	770=97.2%	21=2.63%	—	1=0.12%	792

*B. paratyphosus B.***TABLE VII.**—Showing Result of Examination of the Blood of 792 Normal Persons.

—	— in 1-16	+ in 1-16	+ in 1-32	+ in 1-64	Total.
Females	246=95.71%	11=4.28%	—	—	257
Males ..	513=95.88%	22=4.11%	—	—	535
Total ..	759=95.83%	33=4.16%	—	—	792

The conclusions drawn in each of these three cases is that complete agglutination in a 1:16 dilution should be regarded as suspicious; in a 1:32 dilution as diagnostic.

B. dysenteriae Shiga.

TABLE X.—Showing Results obtained from Examination of the Blood of 792 Normal Persons.

—	— in 1-16	+ in 1-16	+ in 1-32	+ in 1-64	+ in 1-128	Total
Females	59=22.9%	65=25.29%	116=45.1%	15=5.8%	2=0.77%	257
Males	194=36.26%	194=36.26%	127=23.73%	13=2.4%	7=1.3%	535
Total	253=31.9%	259=32.7%	243=30.68%	28=3.5%	9=1.13%	792

Complete agglutination in a 1 : 64 dilution is to be looked upon as diagnostic.

B. dysenteriae Flexner.

TABLE XIII.—Showing Results of Examination of Blood of 792 Normal Persons.

—	— in 1-64	+ in 1-64	+ in 1-128	+ in 1-256	+ in 1-512	Total
Females	42=16.34%	84=32.68%	120=46.69%	7=2.72%	4=1.55%	257
Males	170=31.77%	243=45.42%	119=22.24%	2=0.37%	1=0.18%	535
Totals	212=26.76%	327=41.28%	239=30.17%	9=1.13%	5=0.65%	792

In accordance with the work of others the upper normal limit was found to be high. Agglutination in a dilution above 1 : 128 is significant. The titres of the sera of the females was uniformly higher than that of the males.

[These results are in harmony with those of other workers on this subject. The limit for Shiga (1 : 64) is perhaps rather high. Such limits however must not be taken as applying universally, since different strains of the same organism vary considerably in their agglutinability, a fact which the author omits to mention but which must never be lost sight of.]

E. E. A.

ASSINDER (Eric W.). *The Agglutination Reaction in Cases of Dysentery occurring during the Present War.*—*Birmingham Med. Rev.* 1916. Apr. Vol. 79. No. 452. pp. 89-97.

According to Assinder's agglutination investigations the dysentery we have had to deal with in this war is, in the great majority of instances,

bacillary in origin. Out of 26 sera which agglutinated Shiga's bacillus:—

14	agglutinated with 1 in 160 dilution (or more)		
7	"	" 1 in 80	" (not in 1 in 160)
5	"	" 1 in 40	" (not in 1 in 80)

Of the 22 sera which agglutinated Flexner's bacillus:—

7	agglutinated with 1 in 160 dilution (or more)		
9	"	" 1 in 80	" (not in 1 in 160)
8	"	" 1 in 40	" (not in 1 in 80).

[The author does not appear to be aware of the danger of using low dilutions of the patient's serum for the diagnosis of dysentery due to Flexner's bacillus. Most competent authorities agree that a dilution of serum of at least 1 in 100 must be used if all normal individuals are to be rigorously excluded. The statement that the dysentery of the war is for the most part bacillary is probably only true if the locality referred to is the Western front. A large number of cases of amoebic dysentery have been invalidated from the Dardanelles both to the hospitals in Egypt and this country.]

E. E. A.

CHICK (Harriette). The Preparation and Use of Certain Agglutinating Sera. (With a Note on Preparation of Agglutinating Serum for *B. dysenteriae* Shiga by E. Jean DALYELL, M.B.).—*Lancet*. 1916. Apr. 22. pp. 857-861.

This is an excellent compendium of the art of making the agglutinating sera in common use to-day. It could be profitably studied by those whose business it is to prepare these sera. Many points of importance to those using them for diagnostic purposes are also discussed. A section at the end of the paper is devoted to the production of agglutinins for *B. dysenteriae* Shiga. Rabbits were injected intravenously with 20 million bacteria and gradually increasing doses at weekly periods for four or eight doses. The first dose was killed by heat, but the others were living cultures. An average titre of about 2,000 was obtained.

E. E. A.

WOLLIN (Hans). Ueber die Brauchbarkeit des normalen Drigalski-Conradi-Agar für die Dysenteriediagnose. [The Use of Ordinary Drigalski-Conradi-Agar for Dysentery Diagnosis].—*Centraltl. f. Bakt.* 1915. Dec. 29. Vol. 77. No. 3. pp. 283-284.

The crystal-violet is often omitted from Drigalski-Conradi medium in the culture of dysentery bacilli, on the score that it inhibits or even prevents the growth of *B. dysenteriae* Shiga. The disadvantage of this modification is that the simultaneous search for typhoid bacilli,

which is often desirable, is necessarily much more laborious when the indicator is absent. The author shows by experiment that as a matter of fact the inhibition is very slight and recommends the use of the medium with crystal-violet.

E. E. A.

WAGNER (Gerhard). *Eln Bacterium dysenteriae mutabile.*—*München. Med. Woch.* 1916. Feb. 22. Vol. 63. No. 8. pp. 290–291. With 2 figs.

This purely bacteriological contribution deals with the variation of *B. dysenteriae* Shiga on a solid medium at room temperature. Colonies with and without a thick margin are produced. The original paper should be read by those specially interested in bacterial variation.

E. E. A.

CASTELLANI (Aldo). *Notes on Dysentery Vaccination.*—*Brit. Med. Jl.* 1916. Feb. 26. p. 306.

The author first describes a mixed dysentery vaccine, which he used some years ago, the bacilli being cultivated on peptone water. He has since given this up in favour of carbolised agar cultures. The vaccine is made from 24 hour agar cultures of the following strains :—

Shiga-Kruse	..	..	..	..	1000	million.
Flexner	..	..	..	..	1000	„
Hiss Y	..	..	..	..	1000	„
Flexner-like bacillus (No. 1) isolated in Ceylon	..	..	..	..	1000	„
Flexner-like bacillus (No. 2) isolated in Ceylon	..	..	..	..	1000	„

They are made up in normal salt solution with 0.5 per cent. phenol, so that 1 cc. contains 125 million of each strain. About 0.5 cc. is given subcutaneously and repeated in a week's time. The reaction is said not to be severe. Agglutinins are formed, but are inconstant.

Another vaccine consists of the above vaccine combined with the typhoid and paratyphoid (A and B) bacilli. It is given on the same lines. Broth cultures should not be used in the preparation of these vaccines as they give rise to severe local reactions. [The author does not bring forward evidence that the patients are protected by the treatment.]

E. E. A.

SEIFFERT (G.) & NIEDIECK (O.). *Schutzimpfung gegen Ruhr*. [Inoculation against Dysentery.]—*München. Med. Woch.* 1916. Feb. 29. Vol. 63. No. 9. pp. 329-330. With 2 curves.

The dysentery in the German army is mostly due to the Flexner-Y bacillus. The outbreak of a small epidemic afforded the opportunity to inoculate 2,000 people with a dysentery vaccine as a prophylactic measure. The vaccine was prepared from agar cultures of Y bacillus suspended in salt solution and heated for half an hour at 56° C. This thick emulsion was then further diluted in such a way that 1 cc. of suspension contained a loopful of bacilli. An addition of 0.5 per cent. phenol was made. Three injections were given at weekly intervals—0.5 cc. for the first and 1.0 cc. for each of the two succeeding ones.

Careful notes were made of the temperature, local and general reactions, etc., but as the dosage is not accurately given it is not worth while recording these in detail. Suffice it to say that the rise of temperature is considerably less than is usually experienced after a typhoid vaccine. The local and general reactions were very mild. The agglutination titer obtained was on the whole lower than in the case of typhoid vaccination. The practical result of the inoculations was that no further cases occurred in the infected district. It is only fair to state however that a sudden change of weather took place simultaneously, a cool spell with rain succeeding a period of excessive heat.

E. E. A.

HEVER (Karl) & LUCKSCH (Franz). *Ueber Ruhrschutzimpfung II.** [Inoculation against Dysentery.]—*Wien. Klin. Woch.* 1916. Jan. 27. Vol. 29. No. 4. pp. 95-96.

The object of this investigation was to estimate the titer of the anti-bodies found in the serum of persons inoculated with dysentery vaccine. Fifteen men, who had been inoculated against typhoid two months previously, received 1 cc. of a polyvalent dysentery vaccine [strength unfortunately not stated]; seven days later 1.5 cc. of the same vaccine was injected. A preliminary test before the injections showed that a certain amount of agglutinin for both Shiga and Flexner bacilli was present, especially the latter, as well as bactericidal substances. The sera of these 15 persons were tested 14-18 days after the second injection. The effect of the inoculations was to drive up the bactericidal titer considerably but to leave the agglutinin titer hardly altered for both Shiga and Flexner strains. An attempt to estimate the antitoxic power of the sera failed. Incidentally the initial high titer with respect to Flexner agglutinins is in favour of the view, often expressed, that typhoid inoculation increases the production in the blood of protective substances directed against the nearly allied *B. dysenteriae* Flexner. The converse of this has been described, namely, that in the blood of dysentery convalescents immune substances against *B. typhosus* are to be found. From such considerations it is reasonable to assume that the trifling number of dysentery cases which have occurred during the present year of war are directly due to the almost universal use of anti-typhoid inoculation. This point however requires careful statistical study to establish it.

E. E. A.

*For summary of the first communication see this *Bulletin*, Vol. 7, p. 218

FLAGELLATE DYSENTERY.

KENNEDY (Alex. Mills) & ROSEWARNE (D. D.). *Lamblia intestinalis* Infections from Gallipoli.—*Lancet*. 1916. June 10. pp 1163–1165.

The authors have examined 136 cases of "dysentery" from Gallipoli, and have found 12 cases in which "the bacteriological findings and the history suggest that the condition was dependent upon infection by *Lamblia intestinalis*." Details are given of these 12 cases. "All the cases presented a dysenteric type of diarrhoea, with passage of blood and mucus of a considerable degree of severity, and usually associated with abdominal pains. Infection occurred on the Peninsula at varying intervals of time, from one day to six months after landing. Several of the men, although suffering severely from the diarrhoea, kept on duty for one or two months before going off sick." The infection was of long duration. It was found that hot drinks like tea had a tendency to start the diarrhoea again. The authors state that spontaneous improvement only occurred in some cases after a change to a cooler climate. It is noted that, according to STITT, lambliasis is very important in the tropics.

[From the accounts given, it is clear that the faeces of the patients should have been examined more frequently, in order to be sure that no parasite other than *Lamblia* was present, since there is a periodicity in the appearance of protozoal organisms in the faeces.]

H. B. F.

PORTER (Annie). An Enumerative Study of the Cysts of *Giardia* (*Lamblia*) *intestinalis* in Human Dysenteric Faeces.—*Lancet*. 1916. June 10. pp. 1166–1169. With 7 charts.

The results of a numerical study of the cysts of *Giardia* (*Lamblia*) *intestinalis* in the faeces of seven soldiers, patients in Liverpool, are given. Of the patients one was a case of pure lamblial diarrhoea from Flanders, the man not having been to the tropics. The remaining six were soldiers who had been to Gallipoli and were convalescing after dysentery. No Protozoa other than *Lamblia* were seen in them during the researches. The work was conducted during February, March and April, 1916. A daily sample of the stool of each patient was obtained from the hospital.

"Each sample was treated in the following manner. Half a cubic centimetre of sterile normal salt solution was poured into a finely graduated measuring cylinder, and to this faeces was added in tiny portions from different parts of the sample, until the level of the salt solution was at the one cubic centimetre mark. Thus an exact volume—namely, half a cubic centimetre—of faeces was measured on each occasion. This was further diluted with sterile normal saline solution and was thoroughly emulsified, the dilution being continued until an emulsion sufficiently thin for microscopical examination was obtained. The dilution varied with the consistency of the stool, dilutions of 10, 20, 40 and occasionally 80 being employed. A drop of the emulsion was placed in the chamber of a Thoma-Zeiss haemocytometer, precautions similar to those used in making blood counts being observed. Usually the counting chamber was filled four times over for each estimation, great care being taken to ensure that the emulsion was as perfect as possible before the sample drop was taken. The number of cysts in a cubic millimetre of the stool examined could thus be estimated. One-half cubic centimetre of stool was employed for dilution, whether the stool were formed, semi-formed, or diarrhoeic in character."

The volume of certain of the stools of different patients was determined on some occasions.

Details are given of the cases studied, as to their history, number of motions per day and treatment. All of them showed weakness, especially after exertion, and most had received injections of emetine before reaching England. The emetine injections seem to have had little action on *Lamblia*. The numbers of the cysts per cubic millimetre of faeces daily are recorded, together with the graphs thereof, showing daily variation.

The case of pure lambliasis from Flanders showed much blood in the motions on at least three occasions. The motions were also bulky, and were compared with mud, whipped cream and putty in character, being often khaki coloured. Beta-naphthol and mist. terebinthinae were tried and appeared of little use, though they were not pushed. Bismuth salicylate, one teaspoonful, three times daily, gave very encouraging results.

The daily examination of the cases led to the conclusion that "probably there is a greater uniformity of distribution of *Lamblia* cysts in a diarrhoeic stool than in a formed or a hard one. The distribution of cysts in different parts of a stool, however, varies to some extent, but attempts were made to allow for this in the taking of the sample and in the making of the emulsion. As a rule there appeared to be more parasites in a diarrhoeic stool than in one of firmer consistency." The possible numbers of cysts in a bulky stool, in a stool of average volume and in one of small volume are computed, the respective numbers of cysts per cubic millimetre of faeces being 14,000,000,000, 324,000,000, and 10,000,000, in round numbers.

Interesting general inferences are made. Relapses of lambliasis occurred. The pathogenicity of *Lamblia* is briefly discussed and the harmfulness of *Lamblia* cyst-carriers is indicated, especially where sanitation may be primitive (as in country districts), and there is danger of outbreaks of lamblial diarrhoea among children in Great Britain. The danger from rats and mice who can take up and harbour *Lamblia*, is also pointed out. Regarding the administration of drugs to eliminate *Lamblia*, it is stated that "probably when cysts are few in the stool of a person suffering from lambliasis, there are numerous flagellates in the duodenum and other parts of the intestine of the patient, and it would be well to try medicaments at such periods. Thus, it might be hoped that the flagellate organisms would be killed before they encysted, and the formation of a new 'crop' of cysts be thereby prevented." Casual examinations of infected stools, made at irregular intervals, lead to fallacious impressions and are condemned. Periodicity varies somewhat in different cases. In some there was a period of about a fortnight between the maximal crops of cysts; another period found was ten days.

H. B. F.

SANGIORGI (Giuseppe). *Lamblie e Spironemacee nell' intestino umano.* —*Pathologica.*—1916. May 15. Vol. 8. No. 181. pp. 162–164.

The author examined faeces of soldiers in Venetia. The faeces were dysenteriform and cholera was suspected. Search for cholera vibrios being negative, other excitants were looked for. Amoebae and *Balantidia* were absent, and the only organisms found in one soldier

were *Lamblia*. It is considered highly probable that *Lamblia* was the causal agent of the dysenteriform symptoms. Cubical epithelial cells were found in the stools, having been shed into the intestine, and lesions of the mucosa probably occurred where attached *Lamblia* were numerous.

Spirochaetes [inaccurately termed *Spironemacea* by the author] were found in the faeces of healthy and unhealthy persons. Apparently two main types of spirochaetes are distinguished. The author endeavours to separate the organisms of the first type into three subtypes, according to dimensions, but there appears to be little real distinction between them, as the lengths vary from 3.2μ to 8μ or 10μ and the breadths measure up to 0.4μ to 0.5μ . The first type is correlated with *Spirochaeta eurygyrata*. The organisms of the second type are more rectilinear and measure 5μ to 10μ in length and a fraction of a micron in breadth. The ends may be truncated or tapering. The author thinks that the spirochaetes of his second type may be correlated with *S. stenogyrata*. The organisms were found in 20 per cent. of the cases of intestinal affections examined. He thinks that the spirochaetes may be harmless saprophytes which may have the power of becoming pathogenic, and speculates as to their origin.

H. B. F.

Low (George C.). **The Treatment of *Lamblia* Infections.**—*Brit. Med. Jl.* 1916. Mar. 25. p. 450.

The author recalls that previously he has pointed out that in cases of lambliasis treated by him, emetine, beta-naphthol and methylene blue all failed "completely to sterilise the patient of his infection." Apparent improvement occurred but was proved to be of a temporary nature only. Toxic symptoms following treatment with methylene blue were considered by Major MARSHALL and GEE, in an old paper of theirs, to be due to the difficulty of getting zinc-free methylene blue, and the use of extract of hyoscyamus with methylene blue to prevent bladder trouble was also recommended. Bismuth alone, salicylic acid alone, salol, thymol and cyllin have been ineffective in the experience of Dr. Low.

The author notes that cures of lambliasis may be more apparent than real, a purge causing the parasites to be voided again.

A patient infected with *Trichomonas* has also been under observation. The parasites seemed to disappear without treatment and had not reappeared at the end of one month. With regard to so-called successful treatments, the author is "certain that many so-called successes, if followed up for a sufficiently long period (six months to a year), would have to be written off and debited to the failure column."

H. B. F.

RHAMY (B. W.) & METTS (F. A.). **Flagellate Protozoa as an Etiologic Factor of Dysenteric Diarrhea. Report of a Series of Cases of *Trichomonas* Dysentery, including a Local Epidemic with Seventeen Deaths.**—*Jl. Amer. Med. Assoc.* 1916. Apr. 15. Vol. 66. No. 16. pp. 1190-1191.

One of the authors, during seventeen years laboratory experience, has never found flagellate Protozoa "except in cases with existing or

recent acute or chronic diarrhoea, and has become convinced that these parasites are of more importance as etiologic factors in diarrhoea than has been given them."

Trichomonas intestinalis, as seen by the authors, measured 17μ by 10μ , "with four or more flagella." The parasites live best in neutral or slightly alkaline media, and for this reason "any tissue of low vitality may harbour them." The cases were observed by the authors at various times in different parts of Indiana. In 1909 there was an epidemic of dysentery in Liberty Township, Wells County, Ind., and out of 78 cases there were 17 deaths.

Details are given of seven selected cases of pure *Trichomonas* infection observed between 1907 and 1915. The patients drank impure water, and a few days later they had diarrhoea with colicky pains, watery or slimy blood-stained stools, weakness, dyspnoea, loss of weight and progressive anaemia. The skin became yellow with a tendency to urticarial or pellagroid eruptions. The stools contained much mucus, pus, blood and active *Trichomonas*. The blood showed a moderate eosinophilia, from 6 to 12 per cent. The large bowel showed superficial ulcers.

Various treatments were tried, such as ipecacuanha with or without calomel, and emetine hydrochloride in doses of 0.5 to 1.5 grains daily for a week, followed by petroleum enemata. The cases responded thereto.

The authors report the cases in order "to call attention, first, to the incidence of a local epidemic and endemic, and second, to a not infrequent cause of acute or chronic diarrhoea." They are convinced that such cases "are not extremely rare."

H. B. F.

CHALMERS (Albert J.) & PEKKOLA (Wainö). **A New Human Intestinal Flagellate in the Anglo-Egyptian Sudan.**—*Jl. Trop. Med. & Hyg.* 1916. June 15. Vol. 19. No. 12. pp. 142-146. With 3 figs.

The new human flagellate was discovered in the faeces of a European resident in the Sudan, who repeatedly suffered from attacks of diarrhoea. A few *Loschia coli* were found in his faeces, also a large flagellate and the new small one. The patient was given repeated doses of purgatives and salol. After one of the purgative doses, when the larger flagellates had nearly disappeared, the small one was found.

The flagellate is fusiform, pear-shaped or more rarely rounded, 5.6μ to 6μ by 2.8μ to 3μ . The circular nucleus measures 1.4μ , and has a central or excentric karyosome. The blepharoplast is well defined. Six anteriorly directed flagella arise from it. Two blepharoplasts may be present, and if so, three flagella arise from each. Two chromatic lines diverge from the blepharoplast or blepharoplasts, and end near the posterior margin in very minute chromatin particles. The lines are axostyles and the minute end particles are now named axoplasts. A posteriorly directed flagellum arises from each axoplast. Encystment and division have not been seen.

The classification of the organism is discussed in detail. It belongs to the Octomitidae, and to the genus *Octomitus*. The new Octomitid is named *Octomitus hominis*, and is defined as follows :—

“Flagellate non-amoeboid organism measuring about 6×3 microns and possessing six anteriorly directed flagella of variable size and sometimes of considerable length springing from a single or double well-marked blepharoplast situate close to the anterior margin. Nucleus, single, roundish, often homogeneous with well-marked membrane and sometimes with a karyosome, and situate at some distance from the anterior extremity.

“Two axostyles are present arising from the blepharoplast and ending near the posterior margin in two small chromatic particles (axoplasts) from which arise the posterior flagella. Periplast thin without markings, cytostome absent, cytoplasm with vacuoles but not swollen out with gelatinous material and not possessing chromatophores.

“Known habitat: Intestine of man in Anglo-Egyptian Sudan.”

After repeated purgation and the appearance of large numbers of the *Octomitus* in the stools, salol seemed to produce excellent effects.

The authors note that *Giardia*, *Octomitus* and *Blastocystis* are all present in the Anglo-Egyptian Sudan.

H. B. F.

MIXED AND UNCLASSED DYSENTERY.

WOODCOCK (H. M.) & PENFOLD (W. J.). Further Notes on Protozoan Infections occurring at the King George Hospital.—*Brit. Med. J.* 1916. Mar. 18. pp. 407–409. With 1 fig.

The faeces of 384 different cases were examined for protozoal parasites, 98 cases being positive. *Blastocystis* was omitted, as it was common, was considered to be non-pathogenic, and was perhaps not a Protozoön.

Table of Cases Examined, showing those Infected with Protozoa.
(Total Cases, 384.)

	No. of Cases.	Percentage of Total.	Percentage of Positives.
Infected with Protozoa ..	98	25.5	
Flagellates :—			
<i>Lamblia</i>	22	5.7	22.4
<i>Trichomonas</i>	14	3.6	14.2
<i>Macrostoma</i>	11	2.8	11.2
Entamoebae :—			
<i>E. coli</i>	57	14.8	58.1
<i>E. histolytica</i>	8*	2.0	8.2
Coccidia :—			
<i>Isospora</i>	10	2.6	10.2

*“This is inclusive of one case of liver abscess, in which the parasites were recovered only from the wall of the abscess.”

Most of the patients had been in Egypt or Gallipoli. A *Lamblia* infection was found from the French front, and a case (who had previously been in India) of a relapse of amoebic dysentery after six years occurred from there also. Notes are given of five of the cases of amoebic dysentery. One of them had liver abscess, and two others were carriers of cysts with no history of true dysentery.

Among six cases of amoebic cyst carriers, mention is made of one with small cysts of the *E. minuta* type, the cysts measuring 7μ to 8μ in diameter. The authors think that this type of cyst may be a distinct variety. The nuclei did not show centrioles.

Heavy infections of *Lambli*a are considered to be distinctly pathogenic. Beta-naphthol 15 grains, with bismuth salicylate 20 grains, thrice daily, "for some days," appeared to effect a cure in two cases. Turpentine in doses of 10 minims three times daily for four or five days was apparently successful in two cases, but failed in two others.

Fourteen cases of malaria were examined. Twelve showed the presence of *Plasmodium vivax*, and two of *Laverania malariae*.

H. B. F.

WENYON (C. M.). **The Protozoological Findings in Five Hundred and Fifty-Six Cases of Intestinal Disorder from the Eastern Mediterranean War Area.**—*Jl. R. Army Med. Corps.* 1916. Apr. Vol. 26. No. 4. pp. 445-460.

The paper records the results of the examination for protozoal infections of 556 cases of intestinal disorders among men invalided from Gallipoli and in hospital in the London area. About 1,500 separate microscopic examinations were made, extending from November 11th, 1915 to January 8th, 1916. "In all cases the specimens [examined] were over three hours old," and in some cases they had been collected the day before. Some infections with unencysted Protozoa may thus have been overlooked, as free unencysted forms were present in only a small number of cases.

The danger of *Entamoeba histolytica* is pointed out with regard to the infected man himself, who may relapse into acute dysentery or develop liver abscess, and with regard to the community, as he may function as a carrier. Sixty cases of those examined were voiding cysts of *E. histolytica*.

Three cases of amoebic dysentery that came under the author's observation at various times and unconnected with the war are described in detail to illustrate the danger of the "carrier" of amoebae. The probable result of the introduction of numbers of carriers will be the appearance of cases of amoebic dysentery among the general public.

Regarding the action of emetine, the author remarks that "in most instances [it] causes the passage of the encysted forms to cease," as it attacks the unencysted forms beforehand. Details of the treatment with emetine of 15 cases of infection with *E. histolytica* are given. The author thinks that the injection of one large dose of the drug might have caused the infection to disappear as well as it did when several daily doses were employed over a longer period.

In cases infected with *Lambli*a, when large numbers occurred, much mucus was present in the stool. The flagellate *Lambli*a appeared in the mucus in almost pure culture, and the author suspects that they were the cause of the excessive mucus production.

In one case of infection with *Isospora*, the dysenteric symptoms observed are considered to have been due to the action of the *Coccidium*, no pathogenic bacteria having been isolated from the faeces. A summary of the protozoal infections found is as follows.

	Pure Infection.	Mixed Infection.	Total.
<i>E. coli</i>	138	79	217
<i>E. histolytica</i>	22	38	60
<i>A. limax</i>	1	5	6
<i>Lamblia intestinalis</i>	43	46	89
<i>Trichomonas intestinalis</i>	4	5	9
<i>Tetramitus mesnili</i>	—	4	4
<i>Coccidium (Isospora)</i>	2	13	15
<i>Coccidium (Eimeria)</i>	—	1	1

Some brief remarks on certain vegetable organisms are given, and there is a table of findings in each of the infected cases.

H. B. F.

FANTHAM (H. B.). **Remarks on the Nature and Distribution of the Parasites observed in the Stools of 1305 Dysenteric Patients.**—*Lancet*. 1916. June 10. pp. 1165–1166.

During the period January 21st to April 18th, 1916, the stools of 1,305 soldiers were examined. The men were in various hospitals in the Western Command, and were relatively convalescent, but had previously contracted dysentery chiefly in Gallipoli. A few cases, however, came from Flanders. Bacteria were not investigated by the author. The parasites, chiefly Protozoa, were observed in fresh preparations, and were as follows:—

No of patients	.. .. .	1291
“ “ in whom parasites were found	.. .. .	446
Total number of examinations made	.. .. .	3325
No. of examinations in which <i>Entamoeba histolytica</i>		
“ “ “ occurred	.. .. .	38
“ “ “ <i>Entamoeba coli</i> occurred	.. .. .	211
“ “ “ Noc’s entamoeba	.. .. .	2
“ “ “ <i>Amoeba (Vahlkampffia)</i>		
“ “ “ <i>limax</i> occurred	.. .. .	2
“ “ “ <i>Giardia (Lamblia) intestinalis</i> occurred	.. .. .	471
“ “ “ <i>Trichomonas hominis</i>		
“ “ “ occurred	.. .. .	2
“ “ “ <i>Chilomastix (Tetramitus)</i>		
“ “ “ <i>mesnili</i> occurred	.. .. .	1
“ “ “ <i>Cercomonas parva</i>		
“ “ “ occurred	.. .. .	2
“ “ “ Coccidia (apparently <i>Isospora</i> type) occurred	.. .. .	4
“ “ “ <i>Spirochaetes</i> occurred	.. .. .	42
“ “ “ <i>Blastocystis enterocola</i>		
“ “ “ occurred	.. .. .	198
“ “ “ <i>Taenia</i> embryos occurred	.. .. .	1
“ “ “ <i>Hymenolepis</i> embryos		
“ “ “ occurred	.. .. .	1
“ “ “ <i>Trichocephalus</i> eggs		
“ “ “ occurred	.. .. .	3

Regarding the distribution of some of the parasites, the author remarks :—

"The proportion of examinations positive for *Entamoeba histolytica* is somewhat low on account of the relatively large number of injections of emetine received by the men before reaching England, some patients having had as many as forty injections. It will also be seen that the high proportion of examinations showing *Lamblia* is evidence that injections of emetine have apparently little action on these flagellates, many of the *Lamblia* cases having been previously treated with the drug. Administration of emetine by the mouth might perhaps be more efficacious in some cases."

At least one case of lamblial diarrhoea and one case of amoebic dysentery were found among soldiers who had only been on the western front in Flanders, and had never been in the tropics. A summary of the combinations of the parasites found in the 446 positive cases is given, and shows the various single and multiple infections. Single infections of *Lamblia* occurred in 137 cases and of *Entamoeba coli* in 81.

In addition 499 examinations were made of 14 special cases in Liverpool. The stools were examined daily. The parasites therein are recorded in the following table :—

No. of special cases; all of them parasitised	..	..	14
Total number of special examinations	..	..	499
No. of occasions on which <i>Entamoeba histolytica</i> was found	..	..	27
" " " <i>Entamoeba coli</i> was found	..	..	45
" " " <i>Giardia (Lamblia) intestinalis</i> was found	..	..	348
" " " <i>Trichomonas hominis</i> was found	..	..	1
" " " <i>Chilomastix (Tetramitus) mesnili</i> was found	..	..	7
" " " <i>Cercomonas parva</i> was found	..	..	3
" " " <i>Spirochaetes (S. eurygyrata)</i> were found	..	..	36
" " " <i>Blastocystis enterocola</i> was found	..	..	22

Details are given as to the single and multiple infections in these special cases. Variation in the periodicity times of the different parasites in a multiple infection is mentioned. Attention is drawn, from the figures, to the difficulty of completely eliminating parasitic Protozoa from the human alimentary tract, and to the importance of examining for parasite-carriers.

A. P.

ARKWRIGHT (J. A.), YORKE (W.), PRIESTLEY (O. H.) & GILMORE (W.).
Examination of Fifty Dysentery Convalescents for Carriers.—*Brit. Med. J.* 1916. May 13. pp. 683-684.

The authors set themselves the task of examining 50 convalescent dysentery cases three to six months after the onset of the acute attack. They found nine persons still excreting *E. histolytica* and two still excreting *B. dysenteriae* Shiga. This gives 11 persons, or 22 per cent., as possible sources of infection. In both of the cases from which Shiga

was isolated, *E. histolytica* was also found. [The value of the analysis of the cases in this report is much diminished by the absence of any information as to where the investigation was carried out, and where the cases came from.] E. E. A.

TRIBONDEAU & FICHET. Résultats de l'analyse bactériologique des selles dans 217 cas de dysenterie provenant du corps expéditionnaire d'Orient (C. E. O.).—*Bull. Acad. Méd.* 1916. Mar. 14. Vol. 75. No. 11. pp. 317-318.

Of the 217 stools examined bacteriologically at Toulon from soldiers returning from the Orient with dysentery, 169 gave negative results as regards the bacilli known to cause the disease. This large proportion of cases may be partly explained by the fact that the majority of the soldiers were on the road to recovery by the time they arrived at Toulon. The 48 positive cases consisted of:—

Amoebic	10
<i>B. dysenteriae</i> Shiga	23
<i>B. dysenteriae</i> Y	2
Morgan's bacillus No. 1	13

One of the amoebic cases was known to be a carrier, and three others had called at Alexandria. This is the first time Morgan's bacillus had been suspected of being a causative agent in any disease other than epidemic infantile diarrhoea. [The connection between this bacillus and dysentery would have been more complete if agglutinins had been demonstrated in the sera of some of the patients from whom it was isolated.] E. E. A.

RUSSELL (B. R. G.). Intestinal Disorders arising from Protozoal Infection.—*Lancet*. 1916. June 10. pp. 1161-1163.

An account is given in this paper of three cases of infection with *Entamoeba histolytica* and one of lamblial infection. The third patient had contracted amoebic dysentery in Egypt about the middle of April, 1915. He was treated with emetine. In January 1916, when in England, entamoebae were again present in his faeces, and treatment with emetine was recommenced, to which the patient responded. The fourth case was an infection with *Lamblia intestinalis*, probably contracted on the way to Egypt, by drinking lemonade at Malta. Treatment by emetine was tried but the patient did not respond. However, he became better when he reached a cooler climate. The patient is now under treatment by thymol.

An experiment was undertaken with respect to the action of the *Lamblia* on the host. A loopful of faeces containing *Lamblia* cysts was rubbed up in milk and some was introduced into the pharynx of three mice by means of a pipette. Three days later, one of the mice was killed, and on examination it was found that two inches below the pylorus there were numerous flagellate *Lamblia*. In the lower part of the bowel, a few cysts were seen. The two remaining mice were killed, but they were negative. The controls also were negative. The author thinks that perhaps he "was too precipitate" in killing the experimental infected mouse [but sufficient precautions against spontaneous infection of the mice do not seem to have been taken].

H. B. F.

ROUSSEL (L.), BRULÉ, BARAT & PIERRE-MARIE (André). *Les associations de l'amibe et des bacilles dysentériques.*—*Bull. et Mém. Soc. Méd. des Hôpit. de Paris.* 1916. Mar. 3 ser. Vol. 32. No. 7-8. pp. 261-273.

In July 1915, following the arrival of an African regiment, diarrhoea with blood and slime broke out in a territorial regiment with which they came in contact. It assumed the size of a small epidemic. In September it began to abate. Dysentery bacilli were isolated 76 times. The most notable anomaly about the epidemic was the failure of anti-dysentery serum. Some of the affected soldiers had previously been in Africa where they had contracted amoebic dysentery. An examination of the stools for protozoa gave many positive findings of *E. histolytica* and it was then recognised that the epidemic was in reality one of amoebic dysentery. Treatment with emetine and especially with neosalvarsan produced rapid and lasting recovery. Several amoebic cases occurred among soldiers who had never quitted their native land but had inhabited trenches formerly occupied by colonials. It may be questioned whether all the epidemics which have arisen during the war are not fundamentally amoebic, the secondary bacillary element having, in many cases, alone been studied. In these mixed infections it is always the amoeba which assumes the chief rôle.

The number of samples of faeces examined during seven months was 687, most of which contained blood and mucus. Dysentery bacilli, carefully identified, were found 76 times. In 15 cases bacilli were associated with amoebae. Some of the cases were purely amoebic, but it is doubtful whether pure bacillary dysentery existed. The agglutinative power of the serum was usually poor, which is in accord with the view that the bacillus is of secondary importance. The sera of 30 of the cases which had yielded bacilli in the faeces, were tested for agglutinins. Of this number 11 agglutinated neither the bacillus isolated from their stools nor yet the stock strain of *B. dysenteriae*; 13 agglutinated both their own and the stock strains; 6 did not agglutinate their own but did agglutinate certain other cultures; of these last, three, from which bacilli allied to Flexner had been isolated, agglutinated a strain of Flexner, while three others which had yielded Shiga, did not agglutinate their own bacilli, nor the stock Shiga strain, but did agglutinate Flexner's bacillus. Almost a half of the cases cited, therefore, agglutinated their own respective bacilli. Of 138 agglutinations carried out from August to December 1915, 47 were positive, including 33 Flexner, three Shiga and six both Flexner and Shiga. The serum dilutions for the test were 1 : 50 in the case of Shiga, and 1 : 80 to 1 : 100 in the case of Flexner. In the authors' experience normal persons never give a positive reaction with these dilutions. [Many authors consider 1 : 160 or 1 : 200 as the upper normal limit for Flexner.]

An examination of the bacilli isolated was made and several aberrant types were found as shown in the table (p. 141).

The moral to be learnt from these investigations is that even in our climate we are not justified in calling an epidemic true bacillary dysentery, although dysentery bacilli have been found in the stools, unless we have excluded the presence of amoebae by a careful search. This point is of great therapeutic importance.

E. E. A.

ROUSSEL (L.), BRULÉ, BARAT & PIERRE-MARIE (André).]

[Trop. Dis. Bull.

	Number of samples isolated.	Action on Sugars.					Agglutinations.				Pathogenic action on the guinea-pig.	
		Mannite.	Maltose.	Glucose.	Levulose.	Galactose.	Saccharose.	Indol.	Serum I. Anti-Flexner. 1 per 100.	Serum II. Anti-Flexner and Anti-Shiga. 1 per 50.		Serum III. Anti-Flexner and Anti-Shiga. 1 per 100. Anti-Shiga. 1 per 1000.
Shiga type ..	..	0	0	0*	0	0	0	0	+	+	+	—
Flexner type ..	..	+	+	+	+	+	0	+	+	+	0	—
Microbes isolated												
Type I (Hiss) ..	46	+	0	+	+	+	0	0	+	+	0	Died in 36 hours.
Type II (Shiga) ..	10	0	0	+	+	+	0	0	0	+	+	Survived.
Type III (para-Flexner)	11	+	+	+	+	+	0	+	0	+	+ or 0	Died in 36 hours.
Type IV (para-Hiss) ..	3	+	0	+	+	+	0	+	0	+	0	Died in 12 hours.
Type V (para-Shiga) ..	4	0	0	0	0	+	0	+	0	0	0	Died in 12 hours.

*This is an error on the authors' part, as *B. dysenteriae* Shiga always ferments glucose.

ORTICONI (A.) & NÈPVEUX, Sur l'étiologie de quelques diarrhées et dysenteries rebelles.—*Bull. Soc. Path. Exot.* 1916. May. Vol. 9. No. 5. pp. 293-299.

A cause can often be found for many of the indefinite diarrhoeas labelled "enteritis" or "chronic dysentery" if a careful search is made. Thus a small but ever-increasing number yield *E. histolytica* in the faeces, cases moreover which have never left France but have been closely associated with colonials or others who have been abroad. The authors also associate *Trichocephalus trichiuris*, *Ascaris lumbricoides* and *Lambliia intestinalis* with some cases of diarrhoea.

E. E. A.

FLUSSER (Emil). Die Ruhr der Kindern in Russisch-Polen. [Dysentery amongst Children in Russian Poland.]—*Med. Klinik.* 1916. Mar. 26. Vol. 12. No. 13. pp. 386-389.

In September 1915 a dysentery epidemic occurred in Russian Poland affecting the civil population. In the course of five weeks 28 cases were met with chiefly in children, as the following analysis shows:—

Age.	No. of Cases.
62	1
16	1
15	1
14	1
10	2
8	1
6	2
5	3
4	2
3	4
2	5
1	5

The disease is endemic in this country. Its greater incidence in the early years of life finds an analogy in the case of measles. In our country mothers look upon measles as an unavoidable illness for almost every child, one attack conferring immunity in most cases for a life-time. In Poland it is the same with dysentery. The mothers think that everyone must sooner or later fall a victim to the disease and the sooner it is over the better. No measures therefore are taken to avoid infection and it is a common sight to see several children playing round the cot of an infected child, in fact coming into the closest contact with it. The people consider that one attack protects the individual against further trouble. In addition they say that there is more danger to adults than to children, a fact which the author's experience seems to confirm. Certain points of difference mark the course of dysentery in children. In the first place the haemorrhagic stage is shorter. During October and November 1914 the cases occurring amongst soldiers and civilian adults were serious in comparison with those seen amongst the children. Prodromal or initial symptoms, appearing some time before the passing of blood, are common but are seldom found in adults. Vomiting, rigors, abdominal disturbances

and headache are often seen prior to typical stools. The haemorrhagic period usually lasts from five to seven days. The number of stools is excessive—five, six, and even twelve in an hour. Genuine symptoms of intoxication are only seen in the initial stage. Not only the large gut but the whole digestive tract becomes involved. When the blood disappears from the motions the child does not become convalescent as is usual with grown-up people but enters upon a new stage the symptoms of which are determined by the extent of damage to the digestive system. Four children in their first year, watched throughout the course of the disease, could tolerate no other food than their mother's milk. All of them suffered from meteorism. There was a tendency in all to exhibit a subfebrile temperature. While the temperature during the haemorrhagic stage was normal or subnormal, in the next stage it varied between 37.5° and 38° C. If breast-fed the child was usually well in from one to two weeks after the disappearance of blood from the stools.

As regards treatment, breast-feeding was chiefly relied upon. Sucklings received no medicinal treatment. In the case of older children opium was of great use for counteracting the painful tenesmus of the acute stage. Purges were never used.

E. E. A.

ROBERTS (Dudley). *A Clinical Study of Chronic Diarrhea.*—*Amer. Jl. Med. Sci.* 1916. Feb. Vol. 151. No. 2. (No. 527). pp. 259–266.

An analysis of 74 ambulant cases of chronic diarrhoea, selected in the sense that the patient's condition justified thorough and repeated examination, but excluding carcinomatous and syphilitic ulceration. Both kinds of dysentery are rare in New York, so that chronic diarrhoea is relatively infrequent. About a third of the cases showed achylia gastrica, by which is meant that there was no free HCl in the test meal, together with a low total acidity. The author considers that this condition renders the individual more susceptible to chemical, mechanical and microbic injury. [Diminished gastric acidity has been observed as a frequent concomitant of true dysentery.] Another group of the cases without achylia showed ulcerative colitis, five amoebic in origin and six non-amoebic. Amoebae can best be demonstrated by taking scrapings from the ulcerated patches with a dull curet. As regards treatment of chronic colitis 3 oz. doses of bismuth sub-carbonate once a week were combined with daily rectal injections of 8 to 16 ozs. of a 10 per cent. solution of gelatin at a temperature of 120° F. A diet rich in cellulose or the hemicellulose agar helps to prevent recurrence. These cases have nearly all done well in spite of gastric conditions. The author reports two severe cases of intractable dysentery passing blood which were cured permanently by 40 minim daily doses of "trimethyl-methoxy-phenol" by the mouth, and the addition of it to gelatin injections. It is said to be non-toxic as it is not absorbed from the intestine.

Other causes are neurotic conditions, stasis of the colon (eight cases), hyperthyroidism (nine cases), pancreatic disease, Addison's disease (five cases).

E. E. A.

LIEBERS. *Ueber Polyneuritis nach Enteritis.*—*München. Med. Woch.* 1916. Mar. 7. Vol. 63. No. 10. pp. 369-370.

The author points out that irregular muscular and joint pains are frequent in the convalescent stages of many acute diseases, with or without definite evidences of nerve implication. Many of these are put down as purely neurasthenic, but the author thinks that if sufficient care is taken, especially in the neuritis following diarrhoea attacks, a cause can be found. He gives in detail the report of one case. The patient was a soldier who had at first symptoms of dysenteric diarrhoea; he returned to duty but from increasing weariness and difficulty of breathing had again to report sick. He had difficulty in swallowing, speech was nasal and thick, there was some giddiness and diplopia, but no other abnormal nerve reactions. Later, subjectively a blunted sense of feeling was noted over the whole body, objectively a right sided abducens paralysis and paralysis of soft palate on both sides was found with an absence of knee reflex and high degree of ataxia; Romberg's sign was positive. The weakness and ataxia increased, extending to the upper extremities. The Wasserman test was negative. After four weeks he began to improve.

In the discussion of the cause it is noted that no information as to the kind of enteritis which was the chief feature at the commencement of the disease could be obtained, but examination of the blood showed moderate agglutination reactions to *B. pseudo-dysentery* D. Kruse (1/50) and to nothing else; this was obtained three to four months after the intestinal symptoms had passed off. The whole nerve symptoms were so peculiar that the author was driven to the conclusion that the case was one of polyneuritis after enteritis or perhaps pseudo-dysentery.

P. W. Bassett-Smith.

MOORHEAD (T. Gillman). *A Note on Dysenteric Arthritis.*—*Brit. Med. J.* 1916. Apr. 1. p. 483.

On the strength of six cases the author believes that an arthritis exists which is a complication of amoebic dysentery, and curable with emetine. The knee-joint was the one most severely attacked. The absolute proof that the condition was due to *E. histolytica* is lacking. Fluid was not removed from any of the joints for examination.

[Bacillary dysentery was unfortunately not excluded in these cases.]

E. E. A.

SZÉCSY (Eugen). *Die Diät- und balneotherapeutische Behandlung der Dysenterie.* [Dietetic and Balneotherapeutic Treatment of Dysentery.]—*Wien. Med. Woch.* 1916. Mar. 4. Vol. 66. No. 10. pp. 364-367.

The diet must be regulated with an eye to the pathology and pathological anatomy of dysentery. The food must neither irritate mechanically nor chemically. No solids must be given at first.

In conjunction with careful dieting the author has found that a kind of spa treatment gives excellent results in acute bacillary dysentery. For the first three days drinks of half per cent. sodium sulphate in any alkaline mineral water are taken thrice daily. A small glassful of this hypertonic solution is drunk at a time. Afterwards, the

strength and number of drinks per diem are gradually reduced. Thus we pass through isotonic to hypotonic solutions. This treatment was tried in 47 cases—41 Flexner and 6 Shiga. The most marked features were tolerance of food, and change of blood and mucus stools to profuse but painless motions, which by degrees became normal as the strength of the salt was reduced. Some of the cases had been treated previously with bad results but the sodium sulphate drinks combined with careful dieting speedily produced complete cure.

E. E. A.

RATHERY & FOURNIOLS. *Quelques réflexions touchant le traitement des dysenteries.*—*Bull. et Mém. Soc. Méd. des Hôpît. de Paris.* 1916. Feb. 10. Vol. 32. 3 ser. No. 3-4. pp. 133-140. With 2 charts.

The experience of the authors during the war has been that both emetine and anti-dysentery serum are sovereign remedies. In those cases in which they are said to have been unsuccessful, they have almost certainly been inappropriately administered owing to mistaken diagnosis. We have to guard against the inclination to class dysentery coming from warm countries as amoebic and that coming from cooler climates as bacillary. Laboratory examinations are most helpful, especially the microscopic investigation of the *fresh* stool and the agglutinating power of the patient's serum. The authors consider that an agglutination in a serum dilution of 1:20 is diagnostic for Shiga, while they adopt DOPFER's standard, namely, 1:100 dilution for Flexner. The examination of faeces for specific bacteria is a more elaborate procedure and not always practicable.

The authors have noticed that emetine exerts its action in two stages.

1. Rapid fall in the number of stools by the next day after the injections. The number then remains constant (2-6 a day).

2. Towards the 8th or 10th day faecal matter again appears in the stools and the patient is cured.

In addition to specific treatment the authors have had some success with rectal washes of silver nitrate, and also with methylene blue (0.5 gm. to the half litre). The subcutaneous injection of physiological serum, 500 cc. twice a day, is useful in the severe dysenteric diarrhoeas in conjunction with temporary complete abstinence from food.

E. E. A.

DIRKS (Emil). *Beitrag zur Bolus-alba-Behandlung bei Ruhr.* [Bolus Alba Treatment of Dysentery.]—*München. Med. Woch.* 1916. Mar. 21. Vol. 63. No. 12. pp. 441-442.

Several dysentery patients in a military hospital complained of considerable nausea after taking bolus alba, amounting in some instances to vomiting; in addition there was much abdominal pain, particularly when blood was present in the faeces. To combat this tincture of opium was added. Administration by the mouth was combined with rectal injections also containing tincture of opium. The powder forms a protective covering on the ulcerated surfaces. About 100 grams Bolus to the $\frac{1}{2}$ litre, with 10 drops Tinct. Opii. is used. The passage of blood quickly ceases and the diarrhoea comes to an end.

E. E. A.

MOSZKOWSKI. Ein Mittel zur Bekämpfung der blutigen Stühle.
 [Treatment of Bloody Stools.]—*Berlin. Klin. Woch.* 1916.
 Jan. 31. Vol. 53. No. 5. pp. 114–115.

This consists in an intestinal wash with an emulsion of iodoform :—

Iodoform ..	..	..	..	..	80 gram.
Gum arabic ..	..	..	..	..	100 „
Distilled water ..	..	..	..	..	180 cc.

A soft sound is introduced for a distance of 20 in. per rectum, a procedure which is not very difficult with a little practice. The knee-elbow position may be used if necessary. By means of a small glycerin syringe 45–50 cc. of the well-shaken solution is vigorously introduced. Thirteen patients were treated by this method, the number of injections varying from one to five (nine in a very severe case) before the passage of blood ceased. Tenesmus disappeared early, usually after the first injection. These cases were apparently not dysentery as faeces and blood examinations gave negative results. The probable action is that the gum arabic brings about the blood stasis while the iodoform induces rest and has an astringent effect on the intestinal wall. In addition its disinfecting power may play an important part in the healing of the ulcers.

E. E. A.

SPRUE.

WOOD (Edward J.). **The Occurrence of Sprue in the United States.**—*Amer. Jl. Med. Sci.* 1915. Nov. Vol. 150. No. 524. pp. 692-699.

The article opens with a historical survey. Sprue occurs in the Southern States. It has been greatly confused with other diseases, notably pellagra, but it is undoubtedly a disease *sui generis*. The distinctive features of the two conditions may be perhaps best expressed in tabular form:—

*Sprue.**Pellagra.*

- | | |
|---|---|
| 1. No salivation | Salivation a conspicuous symptom. |
| 2. Little or no pain from glossitis, pharyngitis, etc. | Pain acute. |
| 3. No skin lesions | Skin lesions often, though not invariably, present. |
| 4. No nervous symptoms | Organic nerve lesions common. |
| 5. Stools light in colour, acid reaction with much gas. Very foul and limited to the early hours. | Stools darker and more fluid. Also more or less mucus and tenesmus. Not limited to early hours. |
| 6. Great fat and nitrogen loss which points to the possibility of the pancreas being involved. | Fat and nitrogen absorption normal. |

E. E. Atkin.

ASHFORD (Bailey K.). **Studies in Monilliasis of the Digestive Tract in Porto Rico.**—*Amer. Jl. Med. Sci.* 1915. Nov. Vol. 150. No. 524. pp. 680-692.

Sprue is characterised by four cardinal conditions:—(1) Sore tongue, (2) Excessive intestinal fermentation, (3) Light foamy diarrhoea, (4) Diminution in size of the liver. It is a chronic disease interspersed with periods of relative health. Ashford considers that he has found the cause in a new species of *Monilia*, a yeast-like fungus which he has cultivated on artificial media from the tongue of practically all his cases [see this *Bulletin*, Vol. 7, p. 4, and also Vol. 6, p. 237]. The fungus can be found in the superficial cells of the tongue in the early stages only. It is seldom found in healthy individuals. Complement fixation tests were positive, normal controls being negative. *Monilia* can also be isolated from the faeces of cases of sprue. There is a high correlation between districts where bread is eaten and the occurrence of the disease. There appears to be a predisposition to sprue in persons of northern birth. A mycotic septicaemia can be produced in small laboratory animals by this species of *Monilia*.

E. E. A.

FALCONER (E. H.) & ROWE (Albert H.). **A Case of Sprue with Necropsy.**—*Amer. Jl. Trop. Dis. & Prevent. Med.* 1916. Jan. Vol. 3. No. 7. pp. 400-405.

A report on the post-mortem findings in a single case of sprue. The clinical features were fairly typical, showing the sprue tongue, small liver, and characteristic stool. This patient also suffered with marked nausea and vomiting. At the autopsy the intestines were found to be distended and oedematous. The mucosa of the small intestine was oedematous and showed the presence of a few scattered minute haemorrhages. No other pathological lesions which could be attributed to sprue were observed. The disease was complicated by pulmonary tuberculosis.

E. E. A.

ASHFORD (Bailey K.). **The Dietetic Treatment of Sprue.**—*Amer. Jl. Trop. Dis. & Prevent. Med.* 1916. Jan. Vol. 3. No. 7. pp. 377-389.

As there is at present no specific treatment, dieting is of paramount importance in sprue. There are three recognised methods of feeding—milk diet, meat diet and fruit and vegetable diet.

Milk diet.—This is the best if it can be carried out. The milk must be fresh, with a low bacterial count, rich in fat and unboiled. It is given in increasing doses, cold, and very slowly by means of a straw or glass tube. At least ten minutes should be allowed for each milk ration, the aim being to obtain small flocculi in the stomach which may easily be penetrated by the weak gastric secretion. Milk soured with a liquid culture of a Bulgarian strain of the lactic acid bacillus is very well tolerated by most patients, and should be given if the patient does not find it too unpalatable. It is whipped with an egg-beater before taking. In whatever form decided upon the milk is taken every two hours. A laxative dose of castor oil is given at the start and repeated every four days to clear the intestines of fermented material. When milk alone becomes irksome a few bananas may be added to the diet. If there is a distinct idiosyncrasy for milk it should be modified in some way, as is done in the case of infants. A good way is described by the author as follows:—

“A green plantain is peeled and cut into thin slices which are thoroughly dried in the hot sun. They are then powdered in a mortar and from this powder an ‘atol’ or gruel, is made. Strange to say, this gruel with its high content of plantain starch, when mixed in varying proportions with milk has often a most felicitous result in the feeding of sprue patients, intolerant of milk alone.”

After several weeks of a milk diet the improvement in the patient's general condition is remarkable.

Meat diet. In cases requiring the milk diet to be extended beyond 24 days, meat may be given as a break. One half to two pounds of fillet of beef finely chopped, with two ounces of suet added if the meat is free from fat, is allowed per diem, in six equal portions at three-hourly intervals. It is heated in a well buttered saucepan just sufficiently to bring out the aroma but leave the mass of the meat red. It is then served hot. If a painful emptiness is felt at night on this diet a cup of hot water containing 10 grs. of bicarbonate of soda may

be taken. Repugnance to meat in this form is soon established and chicken, fish, or fruit may be substituted for one or two feedings, while fresh vegetables and salads may be added in another week.

This diet is not so good as a milk diet and should therefore only be resorted to when milk cannot be taken.

Fruit and Vegetable Diet. When both of the above diets are not tolerated recourse must be had to this diet. Bananas are the staple fruit. The author cites a case of sprue cured by a diet of bananas alone—15 to 20 or more were consumed in a day. Any available vegetables may be given in conjunction, which do not contain much starch like potatoes.

After a month or six weeks on a strict diet carbohydrates may be gradually added, returning to the strict diet on the slightest suspicion of a relapse. Sugar should be restricted as long as possible, as well as an excess of greasy food, including cakes and pastry.

Results of Treatment. A selection of 98 cases has been made, all of which presented the typical features of sprue in their entirety.

Treated by milk or some of its modifications.

Died	7 or 8.43 per cent.
Cured	50 „ 60.2 „
Improved	21 „ 25.3 „
Unimproved	5 „ 6 „

Treated by meat alone or by meat, fruits and fresh vegetables, or by fruit alone, or combined with fresh vegetables :—

Cured	3
Improved	2

Cases observed for a long period in which a liberal carbohydrate element was added to the diet by the patient :—

Unimproved	5
Died	5

E. E. A.

GONZALEZ MARTINEZ (I.). The Complement Deviation Reaction applied to the Diagnosis of Moniliasis of the Digestive Tract.—*Amer. Jl. Trop. Dis. & Prevent. Med.* 1916. Jan. Vol. 3. No. 7. pp. 390–391.

The antigen was prepared from three strains of *Monilia* isolated by ASHFORD from cases of sprue. After incubating the cultures on Sabouraud's glucose agar for three days they were ground up, suspended in 10 cc. of normal salt solution and shaken for two hours. Phenol 0.5 per cent. was added. It was then heated for one hour at 56°. A unit of this antigen was taken to be 0.4 cc. Some three or four cases of sprue gave a positive complement deviation reaction, while a dozen sera sent in for Wassermann reaction served as controls and were all negative.

E. E. A.

ASHFORD (Bailey K.). Further Experimentation in Animals with a Monilia commonly found in Sprue.—*Amer. Jl. Med. Sci.* 1916. Apr. Vol. 151. No. 4. pp. 520-528.

Monilia X, isolated from nearly 100 cases of sprue, causes death from septicaemia when inoculated into guinea-pigs and white rats. The injections were mostly intraperitoneal. On artificial media the strain soon loses its virulence, which is quickly restored by passage through susceptible animals. A recently isolated culture from a case of sprue when fed to an animal usually will not kill it; exaltation of virulence by passage through animals must first be undertaken. Ashford believes that a sudden primary pneumonia followed by a secondary septicaemia leads to the death of the animals. Failing these lesions they succumb more slowly to intestinal intoxication. Monilia septicaemia induces necrotic areas in lungs, liver, kidneys, and spleen, known as "white spots." Localised in the skin, typical blastomycotic ulcers are formed, due to necrosis without pus formation. Monilia has not been seen to give rise to pus. The experimental animals that have died of septicaemia show lesions most frequently in the lungs; the next most frequent site is the kidneys.

E. E. A.

TROPICAL DISEASES BUREAU.

TROPICAL DISEASES
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[No. 3.

CHOLERA.

FLU (C.). **Epidemiologische studiën over de cholera te Batavia, 1909-1915.** [Epidemiological Studies on Cholera in Batavia, 1909-1915.]—*Geneesk. Tijdschr. v. Nederl.-Indië*. 1915. Vol. 55. No. 6. pp. 863-925. With 3 charts.

A detailed and extremely interesting discussion of the course and causes of the various outbreaks of cholera occurring in Batavia during a period of six years, together with the results of experiments carried out to establish the importance of flies as distributors of the disease, the frequency of cholera carriers and the longevity of *V. cholerae* in water and on articles of food. In three charts are plotted curves representing cholera cases, rain and height of river—monthly observations for the whole six years and daily observations for two selected years.

The following series of the writer's conclusions, with the addition of statements and tables from the paper that precedes it, gives a summary.

1. Great periodicity is observed in the epidemic outbursts of cholera; the dry seasons favour them while during the rainy seasons only sporadic cases occur.

2. Rain acts in many ways against a spread of the disease, mechanically washing the superficially soiled earth, cleansing the streams, destroying the breeding places of flies, shortening the life of cholera vibrios present in the ground by inducing a greater biological activity (during the dry season the protozoa and bacteria of the soil are very greatly reduced in numbers and can affect alien organisms to but slight extent; the writer found *V. cholerae* had in earth an average life of two days in the rainy season as against four days in the dry season), diluting the infective material which reaches the stream. A single heavy shower on the other hand may increase the risks of infection, as the charts seem to show, for while not enough rain falls to revive the biological activity of the soil and to decrease effectively the number of flies, infectious material can be swept into and thus pollute streams which at the same time do not receive enough water to cleanse them.

3. The periodicity of epidemics also stands in relationship to the immunisation which each outbreak of cholera effects in the population, an immunisation lasting apparently six months during which time very few cases of cholera occur and then mainly among new comers, who presumably have not withstood a recent cholera epidemic.

4. Although the soil and the water of streams play considerable rôles in cholera epidemics and although at one time of the year (the dry season) cholera organisms are able to survive in the soil for a longer period, no specific influence can be said to be exerted by either soil or water.

5. Neither in river water nor in the soil nor in the alimentary canal or on the feet of flies can cholera vibrios exist saprophytically. The following table shows the result of infecting some 40 litres of river water with 5 cc. of rice water stools on June 24th :—

Date of examination.	Quantity of water or mud examined and the result.			
	1 cc. water.	5 cc. water.	50 cc. water.	100 cc. water.
24th June ..	+	+	+	+
28th June ..	—	—	—	—
30th June ..	—	—	—	—
2nd July ..	In ca. 100 and 300 cc. of mud from the bottom of the aquarium : no <i>V. cholerae</i> .			
4th July ..	In 300 and 500 cc. mud : no <i>V. cholerae</i> .			

The short life of *V. cholerae* in water in Batavia is further exemplified by the result of examining some 72 water samples taken in the neighbourhood of cholera cases ; here in spite of the manifestly big opportunities for infection only five of the 72 gave positive returns, as much as 1 litre being needed for examination in some cases before a positive result was obtained. Of 22 wells only one was found infected. As the natives allow the river water to stand in large jars for at least three days to clarify, it would appear that apart from the danger during bathing in the streams when the mouth is rinsed and no doubt water often swallowed, the importance of cholera infected water is not as great as it might be thought.

Although flies do not harbour living vibrios for long, their potential danger can be judged by the fact that in 10 out of 20 houses containing cholera cases flies infected with *V. cholerae* were caught.

6. The various epidemics that occur in Batavia are, therefore, not connected one with the other across the cholera-free periods by means of a saprophytic survival of cholera vibrios in or on the ground, the bodies of flies or in water. As the connecting links must be regarded those sporadic and slight cases which, if a sufficiently thorough search is made, are found to occur from time to time during the so-called cholera-free season.

7. The place where cholera vibrios survive for longer periods is the human intestine and, in particular, the intestinal tract of those who have withstood an attack of cholera and become chronic carriers.

8. Probably as in the case of typhoid fever, an infection of the biliary passages is the cause of the carrier-state.

H. Schütze.

FLU (P. C.). De levensduur van choleravibrionen in en op den grond van "Cholerakampongs" te Batavia, en de bodemtheorie der cholera asiatica van Max Pettenkofer. [The Longevity of Cholera Vibrios in and on the Earth of Batavian Cholera Kampongs, and Pettenkofer's Cholera Theory.—*Geneesk. Tijdschr. v. Nederl.-Indië*. 1915. Vol. 55. No. 6. pp. 629-666.]

For his experiments the author chose a kampong in Batavia where cholera occurred regularly and with severity, and here in a cemetery marked off a portion of ground which by means of wire netting and a guard was kept free from contamination by animal or man and by a light roofing was protected from the direct rays of the sun.

The experiments were carried out to ascertain the length of life in the earth (on the surface and at a depth of about 15 cm.) of cholera vibrios at various seasons of the year and to show whether after a sojourn in ground which may be taken, in reference both to time and place, to be "disposed" to cholera, the vibrios now possessed the increased capacity for the reduction of nitrates which EMMERICH claimed for them in elucidating PETTENKOFER's theory of cholera.

The technique of the author's longevity experiments was as follows: The earth was sown with agar cultures of *V. cholerae* emulsified in broth; earth-samples, when taken, were put into flasks containing 50 cc. oxgall to which subsequently in the laboratory 200 cc. 1 per cent. alkaline peptone water was added; after six hours' incubation Dieudonné plates were made and if on the following day found sterile the now 24 hours' old oxgall enrichment flask was inoculated on to peptone water and following that on to Dieudonné as a final test for the presence of the comma bacillus. It may be mentioned here that none of these cholera vibrios recovered from the earth was found to be altered in agglutinability at all.

The first experiments were carried out in the second half of April between the times of the West and East Monsoons; rain fell occasionally, the soil was damp and no cholera cases had occurred during or for some time after the experiments; the ground might therefore according to PETTENKOFER be declared locally but not temporarily "disposed" to cholera. It was found that after three days samples taken from the surface of infected land or at a depth of 15 cm. no longer contained living cholera organisms, though other bacteria, amoebae, flagellates, etc., flourished in the peptone water. In May after a fair amount of rain the same result was obtained, whereas in October after a long period of drought and with the ground thus rendered very dry cholera vibrios did not disappear until the fifth day. The experiment was repeated using rice water stools as infecting agent (there were cholera cases now and the ground was to be regarded from PETTENKOFER's stand-point as "disposed" with regard to both time and place). The vibrios disappeared by the fourth day.

On November 1st and 2nd the first rains fell. On the 5th land was infected, half being moistened with tap water every day; in both sections the comma bacillus died out by the 7th day.

The author sees in the increased longevity of cholera vibrios in the earth during the East Monsoon one reason why at that time cholera cases are more frequent and puts the prolongation of life down to the

fact that during the hot dry season the bacteria and protozoa of the earth have to a large extent been killed off and cannot therefore suppress the infecting vibrios so quickly; in the wet West Monsoon season, in addition, possibly infective stools are more speedily washed away by the rains and so disposed of.

To test EMMERICH's theory of an increase in nitrate reducing power acquired by vibrios after a sojourn in temporarily and locally "disposed" earth, the author first examined in this respect the colonies obtained on the Dieudonné plates in the previous experiments. He acknowledges that he was not examining vibrios direct from the earth as EMMERICH did, but decides that if EMMERICH's vibrios with raised virulence are to cause infection by being carried by flies to foodstuffs and so to human beings, the one subculture on Dieudonné should be no flaw in his experiment. The results of the one experiment given in which all subcultures into nitrate broth from the Dieudonné plates proved to be *V. cholerae* in pure culture are shown in the table on page 155.

The author then repeated EMMERICH's experiment with earth sterilised at two atmospheres pressure for 20 minutes and an imitation subsoil-water arranged in flasks and tubes. Samples of this earth (100 mgm.) were taken six days after infection with *V. cholerae* and used for sowing nitrate broth. Here a great increase in nitrate production was observed, but was traceable by the author to denitrifying bacteria which had withstood the sterilising and not to cholera vibrios at all. A subsequent experiment on the same lines but in which the earth was heated on three successive days for 20 minutes at two atmospheres pressure and complete sterility achieved, gave very different results which are reproduced in the following table:—

Time of growth of vibrios in 1% nitrate broth.	N ₂ O ₃ produced by the cholera strain originally.	N ₂ O ₃ in mgms. produced by cholera vibrios after.		
		6 days in earth A.	6 days in earth B.	6 days in earth C.
1 day ..	2 mg.	3.0	1.2	2.5
2 days ..	2 "	3.2	3.4	4.0
3 days ..	3.2 "	5.2	6.8	4.3
4 days ..	5.5 "	5.6	8.8	6.8

These experiments, according to the author, indicate that an increased capacity for nitrate reduction is not acquired by cholera vibrios after a sojourn in earth and, as EMMERICH apparently did not test his nitrate broth for the purity of the cholera growth in it, he is inclined to think that EMMERICH obtained his results owing to 20 minutes at two atmospheres pressure not having sufficed to sterilise the earth completely, denitrifying earth bacteria remaining alive.

The paper closes with the following conclusions:—

1. Earth, even when locally and temporarily "disposed" to cholera, does not play the specific rôle in a cholera epidemic that PETTENKOFER assigned to it.

Time of growth of vibrios in 1% nitrate broth.	N ₂ O ₃ produced by the cholera strain originally.	N ₂ O ₃ in mgs. produced by <i>V. cholerae</i> after its reisolatation from locally and temporarily "disposed" earth.											
		After a sojourn there of						After a sojourn there of					
		1 day.	2 days.	3 days.	4 days.	5 days.	6 days.	1 day.	2 days.	3 days.	4 days.	5 days.	6 days.
1 day ..	1.4 mg.	2	1.4	2.1	2.3	2.3	1.7	1.2	1.1	1.8	1.1	0.6	0.4
2 days ..	1.8 "	3	2	2.5	3.6	3.0	2.7	2.2	1.5	2.1	2.1	1.2	1.0
4 days ..	4.4 "	5.7	4.2	4.3	4.3	4.4	4.9	3.5	3.3	4.4	4.0	3.5	3.0
5 days ..	6.4 "	6.0	5.3	8.5	7.7	6.2	7.0	4.0	4.9	6.6	5.0	5.3	4.5

2. In Batavia cholera vibrios poured over the surface of the ground remained longer alive during the East Monsoon than during the West Monsoon, but an increase in their numbers cannot be said to occur.

3. The nitrate reducing power of *V. cholerae* is not altered by a sojourn in earth both "disposed" and containing nitrates.

H. S.

BAERTHLEIN (Karl) & GRUENBAUM (Edgar). Ueber Seuchenbekämpfung, insbesondere Cholerabekämpfung. [The Campaign against Epidemics, in particular Cholera.]—*München. Med. Woch.* 1916. Mar. 21. Vol. 63. No. 12. pp. 436-439.

A report of the organisation employed at the Hammerstein camp through which prisoners from the German east front have to pass on their way to more permanent quarters. A Russian medical man scrutinises the men as they come in and suspects are segregated subsequently into a number of groups according to the nature of their illness. Further any men who admit to having had cholera within the last two years or diarrhoea of any kind within the last few weeks, are sent for examination as possible carriers of cholera, etc. The remaining men are brought first into temporary quarters, until freed from vermin when they are placed in the "clean" huts and receive various (including cholera) prophylactic inoculations.

The diagnosis of cholera was carried out by inoculation on to Baerthlein and Gildermeister's modification of Dieudonné [this *Bulletin*, Vol. 6, p. 496] direct as well as after a preliminary enrichment in peptone water, so that diagnosis is established in some cases after 12 hours, in others after 36 hours.

Aberrant cholera colonies were observed and regarded by the authors as mutation forms. This type of colony was of very small size, reaching only 1/10th to 1/3rd the size of a normal one and remained constant through many subcultures on a variety of solid media. Only by using Baerthlein's method of prolonged culture in broth with subsequent inoculation on to a good cholera medium was it possible to induce a return to typical cholera growth.

The cholera infection in each new batch of prisoners was by the methods employed quickly stamped out, the last cases, which were generally only carriers, being received about eight days after the arrival of the contingent. The authors consider the cholera inoculations chiefly responsible for this, but recognise also the increased resistance to disease the men would acquire from the better conditions prevalent in camp as compared with those on the field of battle.

The so-called cholera-typhoid, in which a general toxæmia predominates, is discussed and limited to those cases displaying symptoms of a typhoidal nature without an increase in temperature; where the temperature rises the authors have almost always found that a secondary infection has taken place—typhoid, malaria or gonorrhoea.

Cholera vibrios persisted in carriers for one or two to 16 days, only

in two cases for longer periods, viz: 47 and 52 days. The following table, in which unfortunately no absolute numbers of cases are given, shows the beneficial effect of cholera inoculation and also the interesting effect that the majority of carriers occurred among the fully inoculated. In explanation of this, the writers suggest that as inoculation may convert what would have been a severe infection into a slight one, so what might have been a slight infection may be entirely avoided and only a carrier state result. The shortness of time for which the condition lasts, would indicate that any marked danger of inoculation veiling infection indefinitely and so leading to a spread of the disease does not exist.

Cholera cases.	Percentage.	Insufficiently and uninoculated.	Fully inoculated.
Dead	7·7	78·9%	21·1%
Diarrhoea and vomiting..	19·5	79·8%	20·2%
Diarrhoea with occasional vomiting	47·8	61·4%	38·6%
Carriers	24·8	29·5%	70·5%

H. S.

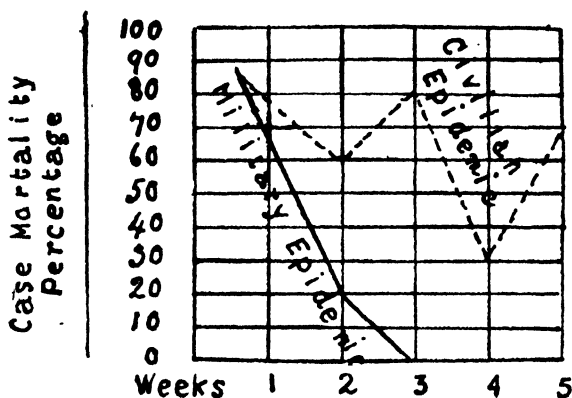
FRANKL (S.) & WENGRAF (F.). **Ueber die Choleraepidemie in Brčka Juni bis Juli 1915.** [A Cholera Epidemic at Brčka.]—*Wien. Klin. Woch.* 1915. Dec. 9. Vol. 28. No. 49. pp. 1346–1348. With a chart.

A description of an outbreak of cholera in Brčka, a town in North Bosnia frequently subject to epidemics but not visited by one during this war until June of 1915, when the disease was introduced by troops temporarily billeted there. The interest of the paper lies in the fact that the military of the town were all inoculated against cholera and the civilians practically not at all. The soldiers however, after the epidemic had been recognised as such, were segregated and the author does not bring proof that the two groups continued to live under similar conditions or were similar in other respects apart from the question of inoculation. His figures are:—

Military (inoculated) had 30 cases with a mortality of 30 per cent.
 Civilians (uninoculated) „ 78 „ „ „ 73·4 „

It was interesting to note of these 30 inoculated cases that 23 with a mortality of ca. 35 per cent. occurred in men inoculated five months previously, while seven with a mortality of only ca. 14 per cent. occurred in men inoculated in the same month of the outbreak.

At the beginning of the epidemic the cases were severe and the mortality high even amongst the inoculated but, as the following table shows, the severity of the disease diminished.



The author considers it possible this indicates that the cholera vibrios lost in virulence, when passing through a series of persons, more rapidly when these were inoculated than when uninoculated. In connection with this hypothesis, it was noted that strains isolated from convalescents, military carriers and light cases towards the end of the epidemic were sometimes bad agglutinators, though normal in other respects and well agglutinable at an earlier stage of the patient's illness.

H. S.

VIOLLE (H.). *De la pathogénie du Choléra.*—*Ann. Inst. Pasteur.* 1916. Apr. Vol. 30. No. 4. pp. 160-162.

The author has shown in previous papers [this *Bulletin*, Vol. 6, p. 41] that *V. cholerae* administered per os will with difficulty multiply in the intestine and cause disease unless the flow of bile is interrupted. He here attempts an explanation of this phenomenon.

He finds that while *V. cholerae* can ferment carbohydrates and acts to a limited extent on proteins, on fat there is no action. In the same way bile alone has no effect on fat, though the two acting together are able to decompose it. The writer suggests that this interdependent action is that of a ferment (in the vibrio) and a catalytic substance (in the bile). Should there be a plentiful flow of bile, vibrios arriving in the intestine would split the fats of the food and thus threaten their own existence by reason of the acid produced. Conversely should the bile supply fail, the way would be open for a multiplication of the vibrio in the small intestine.

H. S.

COULTER (J. S.). **A Study of the Pathology of the Gall Bladder and Biliary Passages in Cholera.**—*Philippine Jl. Sci.* Sect. B. Trop. Med. 1915. Nov. Vol. 10. No. 6. pp. 385-389.

The following table summarises the result of the autopsies on cholera as reported by the writer :—

TABLE I.

Showing condition of the gall bladder and biliary passages.

Year.	Cholera autopsies.	Signs of Inflammation.		Stones.
		Gall bladder.	Bile ducts.	
1908	108	.....	1	.....
1909	123	1	.....	.....
1910	98	.....	.....	2
1911	1	.....	.....	.....
1912	0	.....	.....	.....
1913	79	3	.....	.....
1914	226	*8	.....	2
Total ..	635	12	1	4

* "Thirty-nine of the gall bladders in the 1913-14 series at the time of autopsy were tied off at the common duct and sent to the Bureau of Science, Manila, where they were examined by Dr. Otto Schöbl. He records his results in a recent paper. The cholera vibrio was found in 17 of the cases on bacteriological examination of the bile. Three cases showed microscopic pathological changes in the gall bladder, and in two hydrops cystis felleæ was found—that is, distended gall bladder containing mucus, bile of light amber color, and flaky sediment. One showed thickening of the wall with distended blood vessels, desquamation of the mucosa, and round-cell infiltration."

H. S.

MCLAUGHLIN (Allen J.). **Practical Points in the Prevention of Asiatic Cholera.**—*Milit. Surgeon.* 1916. Jan. Vol. 38. No. 1. pp. 22-29: and *Boston Med. & Surg. Jl.* 1916. Apr. 6. Vol. 174. No. 14. pp. 483-486.

Two reviews on the importance of cholera carriers in relation to the spread of that disease with descriptions of the usual methods of diagnosis, Goldberger's alkaline egg peptone and alkaline meat infusion peptone being recommended selective media.

H. S.

HOPPE-SEYLER (G.). *Zur Kenntnis der Cholera und ihrer Verschleppung.* [Cholera Infections].—*München. Med. Woch.* 1916. Apr. 11. Vol. 63. No. 15. pp. 542-544.

An account of a few cases of cholera that were found in Kiel in September and October of 1915. The vibrio isolated had in all cases the unusual characteristic of being haemolytic. The writer suggests that this would indicate a common source of infection and points out that in Poland (in relationship with which country some of the cases stood) this type is not so uncommon.

H. S.

Cox (Stafford M.). *Abstract of an Address on the Prevention and Treatment of Cholera. Delivered before a Medical Conference in Malta.*—*Lancet.* 1916. July 1. pp. 3-6. With 2 figs.

After pointing out the importance of inoculation as a preventive measure, the writer urges the necessity of segregation and a week's detention of cholera contacts with observation of those released for a further week. With regard to treatment, he does not think cholera serum of use. In earlier years his intravenous injections were of isotonic saline and larger in amount than the hypertonic saline injections of ROGERS. He compares his results with those of that worker, as follows:—

India.	China.
Rogers, 1910 and part 1909.	Cox, 1909.
Collapse stage cases only.	Collapse stage cases only.
Number of cases, 103.	Number of cases, 666.
Average amount injected $4\frac{1}{2}$ pints.	Average amount injected 13 pints.
Mortality, 32 per cent.	Mortality, 18·8 per cent.

The author's cases developed "transfusion rigors" after more than five pints had been injected and he found morphia and belladonna ($\frac{1}{4}$ gr. each) and hot bottles of use at that stage.

More recently he has gone over to hypertonic saline and gives on the average $8\frac{1}{2}$ pints.

A slow continuous infusion (ca. 2 oz. per minute) kept at a uniform temperature is employed; boiled water is used in the absence of distilled, a Berkefeld filter being interposed in the transfusion apparatus.

H. S.

ROGERS (Leonard). i. *Further Work on the Reduction of the Alkalinity of the Blood in Cholera; and Sodium Bicarbonate Injections in the Prevention of Uraemia.* ii. *With a Note on the Technique of the Estimations of the Alkalinity of the Blood by SATIS CHANDRA BANERJEE.*—*Ann. Trop. Med. & Parasit.* 1916. Apr. 29. Vol. 10. No. 1. pp. 139-152.

i. The author's treatment of cholera now includes the giving of alkalies intravenously and is based on observations of the alkalinity and specific gravity of the blood in over 100 cases of cholera.

The relationship between reduction of alkalinity of the blood and severity of disease on the one hand and rise in sp. gr. of the blood on the other hand is clearly shown in the following two tables and confirms the view that the dangerous post-choleraic uraemia is, as SELLARDS suggested, due to an acidosis.

TABLE II.—The Relationship of the Specific Gravity of the Blood on admission and the Alkalinity.

Alkalinity.	Specific gravity below 1060.			Specific gravity 1060-1063.			Specific gravity 1064-1065.			Specific gravity over 1065.		
	Cured.	Died.	Total.	Cured.	Died.	Total.	Cured.	Died.	Total.	Cured.	Died.	Total.
Over N/45 ..	4	—	4	8	1	9	5	1	6	4	1	5
N/45-N/60 ..	4	1	5	7	1	8	2	1	3	8	—	8
N/60-N/80 ..	7	—	7	2	2	4	6	1	7	6	1	7
N/80-N/100 ..	—	—	—	3	2	5	3	1	4	10	2	12
N/100 and less	—	4	4	—	2	2	3	—	3	1	—	1
Total ..	15	5	20	20	8	28	19	4	23	29	4	33

TABLE I.—The Degrees of Reduction of the Alkalinity and the Causes of Death in 104 Cholera cases.

Alkalinity.	Cured.	Died.			Total deaths.	Total cases.	Percentage of deaths.	Percentage.
		Collapse.	Uraemia.	Other causes.				
Over N/45 ..	21	1	1	1	3	24	12.5	23.1
N/45-N/60 ..	21	3	—	—	3	24	12.5	23.1
N/60-N/80 ..	21	2	1	—	3	24	12.5	23.1
N/80-N/100 ..	16	4	1	1	6	22	27.3	21.1
N/100 and less	4	2	4	—	6	10	60.0	9.6
Totals ..	83	12	7	2	21	104		

$\left. \begin{array}{l} 23.1 \\ 23.1 \\ 23.1 \\ 21.1 \\ 9.6 \end{array} \right\} 30.7 \left\} 53.8 \right\} 76.9$

With regard to the administration of the alkali, the method chosen by the writer was as follows :—All cases admitted on the first day of illness receive hypertonic saline ; if a second, third, etc., injection is necessary, the patient receives first 1 pint of alkaline fluid (160 gr. of sod. carb. + 60 gr. sod. chloride) with as much more hypertonic saline to follow as the case needs ; in cases admitted later than the first day of illness and with suppression of urine the alkali is given with the first injection. The sod. carb. is sterilised in the solid to avoid chemical alteration.

ii. Titration of the blood is carried out with capillary volumes of sulphuric acid, $\frac{n}{25} - \frac{n}{80}$ or in greater dilution if required, and serum, mixing on a glass slide and testing with litmus paper to establish which strength of acid gives neutrality. It is important that the glass capsules in which the blood is taken up, should be freed from alkali by washing with dilute sulphuric and distilled water and carefully dried, the ends being sealed with sealing wax and not by heat for centrifuging purposes.

H. S.

ADLER (Oskar). *Die Behandlung der Cholera asiatica im Felde.* [Cholera Therapy during Active Service.]—*Wien. Klin. Woch.* 1916. Feb. 3. Vol. 29. No. 5. pp. 123-128.

The author describes the chief therapeutical measures adopted by him in his mobile laboratory ; these laboratories were apparently provided to the Austrian army, were staffed by one to two specially trained medical men, five nurses trained to epidemiological work and attendants, and were generally placed about seven miles behind the front. Where cholera was to be feared, all suspected cases were treated immediately without waiting for a bacteriological diagnosis.

Unless a case was so slight and of such a character that a very mild course could be predicted, or was so severe that the heart was failing, the author's object was to get rid of toxins already formed in the gastrointestinal tract and to this end he washed out both stomach and rectum with a warm (42° C) animal charcoal suspension (5 gm. to the liter) after giving 2-3 cc. camphor subcutaneously. The stomach being empty after the last washing 5 gm. animal charcoal in a glass of water is administered and further charcoal suspension given to sip, the patient receiving 25-30 gm. per day. This treatment can be carried out entirely by the nurses. The author considers animal charcoal much better than bolus alba for the absorption of toxins.

In severe cases, although charcoal suspension may be given by the mouth, no washing out is performed and chief reliance is placed on the intravenous administration of 3 per cent. saline with 1 cc. digalen and 2 cc. camphor per liter added. The patient is kept in a warmed bed as in the less severe cases.

In comatose cases and those where the chief toxic effect seems to be exerted on the central nervous system, the author has begun to perform lumbar puncture to relieve pressure and to wash out the spinal canal with warm physiological saline to remove toxins.

H. S.

KAUSCH. Traubenzuckerinfusion bei Cholera. [Dextrose Injections in Cholera.]-*München. Med. Woch.* 1916. Apr. 11. Vol. 63. No. 15. pp. 544-545.

A recommendation of the use of dextrose injections in cholera. The writer uses a 5 per cent. solution in water for subcutaneous and a 10 per cent. solution for intravenous injections. He does not consider exact isotonicity very necessary, particularly for intravenous use where almost immediate mixing with the blood takes place. Whether the good effects are to be ascribed mainly to the washing out of toxins, to the replenishment of the body with water, or to the nutritive sugar, the writer is unable to say.

H. S.

MUELLER (Otto). Injektionen mit Hypophysisextrakt und Gelatine gegen Cholera. [Pituitary Body and Gelatine Injections in Cholera.]-*Wien. Med. Woch.* 1916. Feb. 19. Vol. 66. No. 8. pp. 300-305.

After putting forward a plea for the consideration of cholera as in the main an enteritis with only the possibility of a supervening specific intoxication, the writer goes on to describe his therapy, practised apparently on but eleven cases. He regards the first symptoms of most cholera cases to be due to paralysis of the splanchnic nerve brought about by the growth of the vibrios on the intestinal walls. It is the resulting visceral hyperaemia with the attendant anaemia in other parts of the body which has to be treated. Calomel is given if

stools are not sufficiently frequent, and gelatine (1-2 gm. a day intramuscularly) to increase the viscosity of the blood, and pituitary gland (in bad cases intramuscularly, in convalescents subcutaneously) to raise the blood pressure. Intravenous saline injections are, however, not omitted from the therapy.

H. S.

MARASSINI (Alberto). *Sopra un nuovo metodo di ricerca e di isolamento del Vibrione colerigeno nelle feci.* [A New Method for the Isolation of *V. cholerae* from Faeces.]—*Gaz. Ospedali e d. Clin.* 1916. Jan. 16. Vol. 37. No. 5. pp. 67-68.

A slight modification of ARONSON's cholera medium [this *Bulletin*, Vol. 6, p. 495] which the author considers, without however giving any reasons for or proof of his opinion, to be an improvement. As far as can be gathered the ingredients are the same, but a 30 per cent. dextrin solution is substituted for Aronson's 20 per cent. one and 25-30 cc. of 10 per cent. Sod. Carb. [? sicc.] are added per 100 cc. agar instead of 6 cc.

H. S.

SEGALE (Mario). *Metodiche di accertamento batteriologico su vasta scala. Nota I.—Portatori di colera e terreno Aronson.* [Bacteriological Diagnosis on a Large Scale. I.—Cholera Carriers and Aronson's Medium.]—*Giorn. di Med. Milit.* 1916. Feb. 29. Vol. 64. No. 2. pp. 98-104.

The author's chief labour saving modification in the examination of large numbers of carrier stools was not to examine the colonies that have grown on the Dieudonné plates after their inoculation from the peptone water enrichment medium, but to plate from Dieudonné on to Aronson's sugar medium. In this way the number of microscopical examinations is greatly reduced. He found that while 500 stool specimens might give 100 Dieudonné plates showing growth, of these 100, 60-70 might be cut out by a further plating on to Aronson, leaving only 30-40 to be examined microscopically for the necessity of an agglutination test.

A further device for the saving of time and trouble was to send the peptone water tubes to the quarantine stations for direct inoculation from the faeces passed; extra manipulations, washings and possible confusions are thus avoided. [In this he follows OTTO (this *Bulletin*, Vol. 6, p. 498.)]

H. S.

SEIFFERT (G.) & BAMBERGER (H.). *Elektive Cholera-Nährböden.* [Selective Cholera Media.]—*München. Med. Woch.* 1916. Apr. 11. Vol. 63. No. 15. pp. 527-528.

In an attempt to combine the good qualities of Aronson's and Dieudonné's cholera media, as haemoglobin was useless owing to its colour interfering with the fuchsin indicator of Aronson's medium, on

the strength of OTTOLENGHI's observations, the authors added bile instead. It was found that while the addition of bile to Aronson both inhibited the intestinal flora and favoured the growth of *V. cholerae*, the bile itself was very variable, some samples actually inhibiting *V. cholerae* so that a preliminary testing of it would be required in every case.

As pyrrole is to be regarded as a foundation stone of chlorophyll as well as of haemoglobin and the bile salts, this substance was examined as to its suitability. The medium was prepared by adding 25 cc. of an alcoholic chlorophyll solution (Merk's Solutio spirituosus or Extractum urticae spissum) to 60 cc. of 10 per cent. anhydrous Sod. Carb., steaming for one hour; 50 cc. of a sterile 20 per cent. dextrin solution and 50 cc. of a sterile 20 per cent. cane sugar solution are added and all mixed with 1 liter of neutral agar; before use 4 cc. of saturated alcoholic fuchsin is added, then drop-wise a freshly prepared 10 per cent. sod. sulphite solution until decolorisation (about 15 cc. necessary). The plates are dried open and are at once ready for use. This chlorophyll medium should be freshly prepared and poured as soon as mixed as repeated heating darkens it and renders it less selective. Fifty stools were tested on the three media for their power of inhibiting intestinal bacteria.

	On Dieudonné.	On Aronson.	On chlorophyll medium.
Growth.. ..	46%	98%	40%
No growth in ..	54%	2%	60%

Stools artificially infected with cholera could be diagnosed on chlorophyll agar in a dilution at which it was not always possible to do so with Aronson. Morphologically and serologically the vibrios were not altered after cultivation on the new medium.

H. S.

VOLPINO (G.). L'uso del terreno di Aronson nella diagnosi rapida del vibrione colerigeno. [Aronson's Cholera Medium.]—*Polichinico*. Sez. Prat. 1916. Apr. 30. Vol. 23. No. 18. pp. 549-551.

The writer recommends plating on to Aronson after an 8-10 hours enrichment in 1 per cent. peptone water and examination on the following morning of *all* colonies in smears under the microscope and by the agglutination method, as he does not find that *V. cholerae* can always be depended upon to produce red colonies by that time. For this reason he considers ordinary agar of equal alkalinity almost as good as Aronson for rapid diagnosis. Alternative methods are (1) two peptone water enrichments, the first from morning to evening, the second from evening to morning, with smear and agglutination examinations and plating on to Aronson in the doubtful cases; (2) smear examination after one peptone water enrichment, a second enrichment

Table III. shows the result of the Widal reaction with a high titre agglutinating serum (Vibrio W. 1 orig.) and the vibrio isolated from bile of Rabbit No. 152, W. 1 (bile), and W. 1 (orig.) and standard cholera vibrios :—

	Widal reaction with high titre (1 : 10,000) agglutinating serum (vibrio W. 1 (orig.)).				
	1 : 20	1 : 100	1 : 500	1 : 1,000	1 : 10,000
1. Vibrio isolated from bile of Rabbit No. 152 W. 1 (Bile)	+	—	—	—	—
2. Vibrio W. 1 (orig.) from water with which Rabbit No. 152 was immunized . .	+	+	+	+	+
3. Standard cholera vibrio	—	—	—	—	—

Table IV. shows the result of Widal reaction with high titre cholera agglutinating serum (standard cholera vibrio No. 2097) and the vibrio W. 1 (bile) isolated from bile of Rabbit No. 152, and vibrio W. 1 (orig.) :—

	Widal reaction with high titre (1 : 6,000) cholera agglutinating serum (No. 2097).				
	1 : 20	1 : 100	1 : 500	1 : 1,000	1 : 6,000
1. Standard cholera vibrio No. 2097	+	+	+	+	+
2. Vibrio W. 1 (Bile) from bile of Rabbit No. 152 . .	+	+	—	—	—
3. Vibrio W. 1 (orig.) from water	—	—	—	—	—

Serum obtained by inoculation of a rabbit with the recovered strain was seen to agglutinate this recovered strain and *V. cholerae* almost equally well (1 : 6,000 and 1 : 5,000) but the original injected strain merely to 1 : 20.

The absorption tests shown in the following table also pointed to a greater similarity between *V. cholerae* and the recovered strain than between this latter and the injected organism.

Table VI. shows the date of observation, the number of the strain of cholera-like vibrio, the agglutination titre of homologous serum of rabbit, the number of the strains of cholera-like vibrio and standard cholera used to absorb the serum, the naked-eye character of the supernatant fluid after absorption, and the Widal reaction of the supernatant fluid with the original strain of cholera-like vibrio.

Col. 1.	Col. 2.	Col. 3.	Col. 4.	Col. 5.	Col. 6.					
Date of observation.	No. of strain of cholera-like vibrio.	Agglutination titre of homologous serum of rabbit used (Dil. 1:50).	No. of strain of cholera-like vibrios and standard cholera used to absorb serum.	Naked-eye character of supernatant fluid after absorption for 18 hours at 37° C.	Widal reaction of supernatant serum (col. 5) with original strain of cholera-like vibrio (col. 2) after absorption with the various cholera-like and standard cholera vibrio (col. 4) and after centrifugalization for 15 minutes.					
					100	200	500	1000	2000	4000
16-9-15	W. 1 (Bile)	1:4000 Rabbit No. 167	W. 1 (Bile)	Clear	—	—	—	—	—	—
					(Complete absorption).					
			W. 1 (original)	Turbid	+	+	+	+	+	+
					(No absorption).					
			2097 standard cholera	Partially clear	+	+	+	+	—	—
					(Partial absorption).					
			620 standard cholera	Ditto	+	+	+	+	—	—
					(Partial absorption).					

Complement deviation tests indicated a similar relationship.

The author's explanation is that the original strain was not in reality a cholera-like organism but a true cholera vibrio altered by growth in the external world and only tending to resume its true character after passage through the rabbit.

It has been usually thought that though growth in water may alter the agglutinability of cholera vibrios, the antigenic character was much more stable. If however the author's inferences are correct, *V. cholerae* has been altered in the latter respect as well—the original (? altered) strain did not on inoculation into a rabbit produce a serum capable of agglutinating *V. cholerae*.

On isolating the supposed cholera-like vibrio in the first place from water, the author had been unable to allocate it a place in any of the six groups into which he divides cholera-like vibrios; this he regards as being another sign possibly of the vibrio not being a true cholera-like vibrio but an altered Koch bacillus.

H. S.

SCHOEBL (Otto). **Experimental Cholera-Carriers.**—*Jl. Infect. Dis.* 1916. Mar. Vol. 18. No. 3. pp. 307-314.

The author's summary gives a good account of the work described in his paper:—

"Attempts were made to produce in animals a condition which would resemble that of cholera-carriers in human beings. Inoculations of cholera

vibrios into the gall-bladder, stomach, small intestine, blood stream, and serous cavity were made and inoculation by feeding was also tried.

"Direct inoculation into the gall-bladder, stomach, and small intestine and inoculation by feeding proved successful inasmuch as a certain percentage of the inoculated animals were found to harbour cholera vibrios in the alimentary canal. This was ascertained by bacteriologic examination of various parts of the digestive system, made in the great majority of cases immediately after death.

"The intravesicular inoculation proved to be far superior to other methods. Practically every one of the animals inoculated in this way harbored cholera vibrios.

"The duration of the condition, although limited, appears to be sufficiently long for therapeutic experiments."

The table gives an indication of the distribution and longevity of *V. cholerae* in the guinea-pig after inoculation into the gall-bladder.

TABLE I.

The Distribution of Cholera Vibrios in the Alimentary System of Guinea-pigs and the Duration of the Carrier State after Intravesicular Inoculation.

Guinea-pig.	Days after Inoculation.	Gall bladder.	Stomach.	Duodenum	Ileum.	Cecum.	Rectum.
1	1	+	0	0	+	+	0
2	2	+	0	0	+	+	0
62	3	+	—	+	+	+	0
68	3	+	—	+	+	+	0
69	3	+	+	+	+	+	+
3	4	+	0	+	+	+	0
56	4	+	—	+	+	+	+
65	4	+	0	+	+	+	—
49	5	+	—	+	+	+	—
50	5	+	—	+	+	+	—
63	5	+	—	+	+	+	—
34	6	+	—	+	+	—	—
40	6	+	0	+	+	—	—
41	6	+	0	+	+	+	—
54	6	+	—	+	+	—	—
55	6	+	—	+	+	+	—
57	6	+	—	+	+	+	—
58	6	+	—	+	+	—	—
4	7	+	—	+	+	+	—
35	7	+	—	+	+	+	—
59	7	+	—	+	+	—	—
66	8	+	—	+	+	+	—
67	8	+	—	+	+	+	—
70	8	+	—	+	+	+	—
32	10	+	—	+	+	+	—
60	10	+	—	+	+	+	—
33	11	+	—	+	+	+	—
46	13	+	—	—	+	+	—
47	13	+	—	+	+	+	—
48	13	+	—	+	+	+	—
64	16	—	—	—	—	—	—
36	17	+	—	+	+	+	—
43	30	—	—	—	—	—	—

+ = cholera vibrios present in the culture.

— = cholera vibrios absent in the culture.

0 = not examined.

H. S.

BAIL (Oskar). **Ueber das Verhalten der Cholerasubstanz im Immunen Tierkörper.** [The Behaviour of Cholera Bodies in the Immune Animal.]-*Zeitschr. f. Immunitätsforsch.* 1. Teil. Orig. 1916. Mar. 4. Vol. 24. No. 4. pp. 396-410.

This very interesting paper deals with complement fixation experiments carried out with a view to explaining the want of toxicity in cholera sera. Although striking bacteriolytic and other effects are always observed on adding specific serum to cholera vibrios, their toxicity remains unaltered. The author concluded that in an animal given a mixture of this sort (serum + vibrio) free cholera bodies would be found, notwithstanding the bacteriolysis, etc., that had taken place. He directed his search to complement fixing bodies.

The experiment was varied in a number of ways—cholera immune serum being allowed to act on the vibrios before the intraperitoneal injection of the mixture, or given after the vibrios (in the manner of a curative injection), or the experiment being carried out entirely *in vitro*.

Complement fixing bodies were found in the peritoneal exudate, serum and organs of the guinea-pigs and in the saline or normal peritoneal fluid extract prepared from the vibrios treated with serum *in vitro*.

In several cases it was possible to demonstrate in the sera and exudate of treated animals cholera antibodies existing side by side with the cholera bodies and, notwithstanding the close affinity that usually exists between them, apparently not showing any great tendency to reunite.

The author concludes therefore that the combination of cholera immune bodies with the substance of the cholera organisms is not a stable or permanent one, either *in vitro* or *in vivo*, but regularly splits into its component parts.

This liberation of the cholera bodies in spite of the presence of immune serum would explain the want of antitoxic qualities in cholera immune serum. The end to aim at, therefore, in preparing a cholera serum would be to obtain one, not necessarily of great antitoxic power, but capable of entering into a permanent and therefore presumably atoxic combination with the substance of the cholera vibrio.

H. S.

OTTOLENGHI (D.). **La preparazione del vaccino anticolerico per le truppe.** [The Preparation of Cholera Vaccine.]-*Igiene Moderna*. 1915. Nov. Vol. 8. No. 11. 12 pp. *

Here an attempt has been made to estimate the value of various types of cholera vaccine; however as but one animal, as far as one can gather, was in most cases inoculated with each vaccine, conclusions can hardly with justice be drawn. A uniform emulsion of

cholera vibrios in saline was taken and treated in the following ways :— (1) By heating to 53° and 60° for one hour ; (2) ditto but with filtration after autolysis at 37° for 24 hours ; (3) with chloroform or ether in vapour form or with ether in liquid form, the disinfectant being subsequently driven off at 37° ; (4) with hydrochloric acid 1 per mille and subsequent neutralisation with sodium carbonate ; (5) with arsenious acid .5 per cent. ; (6) with calcium hypochlorite 0.39 per thousand ; (7) with perchloride of mercury 1 : 20000. Rabbits were inoculated subcutaneously with these variously treated vaccines and tested after seven days for agglutinins and bacteriolysins. No great difference was found to exist in the degree to which these substances had been elicited ; heating to 53° and killing with ether appeared if anything to give slightly better results and also, as shown by re-testing 20 days later, somewhat more enduring antibodies. The protective power of some of these vaccines, (1) killed at 53° ; (2) ditto with subsequent autolysis ; (3) killed with liquid ether ; (4) killed with ether vapour, was tried for guinea-pigs, by giving a lethal intraperitoneal dose of cholera seven days after inoculation. All the pigs survived except the uninoculated controls and those inoculated with the ether vapour killed vaccine, these two groups dying at about much the same time.

It would thus seem that the preparation of a cholera vaccine by heating to 53° for one hour is to be recommended as simple and effective.

H. S.

KONRÁDI (Daniel). **Ueber den Wert den Cholerascchutzimpfungen.**— [The Value of Prophylactic Cholera Inoculation.]—*Cent. f. Bakt.* 1. Abt. Orig. 1916. Jan. 31. Vol. 77. No. 4. pp. 339-352. With 1 chart.

A paper consisting chiefly of references to well known work. The author examined a small number of cases from time to time after cholera inoculation and found the agglutinin and bacteriolysin titre of the sera rise to a maximum one to two weeks after the second inoculation and sink to almost normal again towards the end of a year.

H. S.

ZOLTÁN VON AJKAY. **Erfahrungen über den Wert der Cholerascchutzimpfung.** [Observations on the Value of Prophylactic Cholera Inoculations.]—*München. Med. Woch.* 1916. Feb. 15. Vol. 63. No. 7. pp. 251-252.

An account of a small group of cases occurring in the Austrian army during the Russian retreat in Volhynia towards the end of September 1915. Two pools were found to be infected with *V. cholerae* and a serious epidemic was feared, but of the 19 soldiers in whom the vibrio

was found, nine only carried for a few days and ten were cases of a very mild type. The writer ascribes [though without proof that the strain was not a poorly virulent one] the mildness and smallness of the epidemic to the fact that the soldiers had all been inoculated against cholera the previous May and June.

H. S.

DANILA (P.) & STROÉ (A.). *Recherches sur les agglutinines des vaccinés successivement contre la fièvre typhoïde et le choléra.*—*C. R. Soc. Biol.* 1916. Jan. 22. Vol. 79. No. 2. pp. 108-111.

It having been previously found [this *Bulletin*, Vol. 6, p. 501] that animals quickly lose the agglutinins produced by inoculation with *V. cholerae*, the authors made a series of agglutination determinations in some 114 soldiers inoculated twice against cholera and three times against typhoid and were able to show that, as is seen in the following table, a similar disappearance takes place here also.

Agglutination with *V. cholerae*.

Time since Inoculation.	Number of cases.	Serum dilution.	Results.		
			Doubtful.	Positive.	Negative.
9 days ..	20	$\begin{matrix} 1:10 \\ 1:20 \end{matrix}$	$\begin{matrix} 2 \\ 4 \end{matrix}$	$\begin{matrix} 9 \\ 0 \end{matrix}$	$\begin{matrix} 9 \\ 16 \end{matrix}$
2 months and 8 days ..	20	$\begin{matrix} 1:10 \\ 1:20 \end{matrix}$	$\begin{matrix} 4 \\ 1 \end{matrix}$	$\begin{matrix} 6 \\ 1 \end{matrix}$	$\begin{matrix} 10 \\ 18 \end{matrix}$
3 months ..	3	1:30	—	—	3
4 months ..	4	1:30	—	—	4
6 months ..	14	1:10-1:30	—	—	14
12 months ..	53	1:10-1:30	—	—	53

They further investigated the agglutinin content of the blood of 40 men inoculated with one type of vaccine, the polyvalent No. 1 of the table, using as antigen the homologous vaccine and three others. As will be seen, two heterologous emulsions gave absolutely negative results, while the living emulsion [it is not stated what relation this bears to vaccine No. 1, with which the soldiers were inoculated] on the whole gave better results than the homologous one, though there was variation from case to case.

Cholera antigen used.

Number of Case.	Living Emulsion.		Polyvalent Vaccine No. I.		Polyvalent Vaccine No. II.	Mono-valent Vaccine.	
	1 : 10	1 : 20	1 : 10	1 : 20	1 : 10	1 : 10	
Inoculated with polyvalent vaccine No. I nine days previously	1	+++	+++	0	—	0	0
	2	++	+	0	—	0	0
	3	+	0	++++	?	0	0
	4	+++	+++	+++++	?	0	0
	5	++	++	0	—	0	0
	6	+	—	?	—	0	0
	7	+	—	+	—	0	0
	8	?	—	?	—	0	0
	9	+	—	+	—	0	0
	10	0	—	0	—	0	0
	11	+	—	++	0	0	0
	12	?	—	0	—	0	0
	13	++	+	0	—	0	0
	14	+++	++	+++++	?	0	0
	15	0	—	0	—	0	0
	16	0	—	0	—	0	0
	17	++	+	+++	?	0	0
	18	?	—	0	—	0	0
	19	++	++	++	0	0	0
	20	++	++	+	—	0	0
Inoculated with polyvalent vaccine No. I two months and eight days previously	21	+	—	++	?	0	0
	22	0	—	++	0	0	0
	23	0	—	++	0	0	0
	24	+	—	0	—	0	0
	25	?	—	0	—	0	0
	26	0	—	?	—	0	0
	27	0	—	0	—	0	0
	28	?	—	?	—	0	0
	29	++	++	0	—	0	0
	30	0	—	0	—	0	0
	31	++	+	++	0	0	0
	32	0	—	0	—	0	0
	33	+++	+	++	0	0	0
	34	++	++	?	—	0	0
	35	++	+++	+++	+	0	0
	36	0	—	0	—	0	0
	37	0	—	?	—	0	0
	38	++	+	0	—	0	0
	39	++	+	0	—	0	0
	40	?	—	0	—	0	0

H. S.

IONESCO-MIHAIESTI (A.) & CIUCA (M.). Sur la recherche de l'agglutinine anticholérique dans le sérum des individus vaccinés contre le choléra. Choix d'un antigène. (A propos de la communication de MM. Danila et Stroe).—*C. R. Soc. Biol.* 1916. June 3. Vol. 79. No. 11. pp. 536-539.

A warning against the use of cholera emulsions killed by heat and the addition of phenol when testing for the presence of agglutinins

Dilution of anti-cholera serum agglutinating in normal saline at 8½ per 1090.	Nhatrang living vibrio. 0·1 cc.		Nhatrang vibrio killed at 60° (1½ hr.) + 0·6% phenol. 0·1 cc.		Mixture of 4 living vibrios. 0·1 cc.		The same mixture killed at 60° (1½ hr.) + 0·6% phenol. 0·1 cc.		Polyvalent anti-cholera vaccine prepared 75 days before in our laboratory. 0·1 cc.				
	Tubes observed macro- and micro-scopically, after												
	5 m.	20 m.	2 hr.	15 hr.	5 m.	20 m.	2 hr.	15 hr.	5 m.	20m.	2hr.	15hr.	suspension.
1. 1/10 1 cc.	++	++	++	++	++	++	++	++	++	0	0	++	++
2. 1/500 1 cc.	++	++	++	++	++	++	++	++	++	0	0	++	++
3. 1/1000 1 cc.	++	++	++	++	++	++	++	++	++	0	0	++	++
4. 1/1500 1 cc.	++	++	++	++	++	++	++	++	++	0	0	++	++
5. 1/2000 1 cc.	++	++	++	++	++	++	++	++	++	0	0	++	++
6. 1/2500 1 cc.	0	0	++	++	++	++	++	++	++	0	0	++	++
7. 1/5000 1 cc.	0	0	++	++	++	++	++	++	++	0	0	++	++
8. 1/10000 1 cc.	0	0	++	++	++	++	++	++	++	0	0	++	++
9. 1/15000 1 cc.	0	0	0	++	++	++	++	++	++	0	0	++	++
10. 1/20000 1 cc.	0	0	0	++	++	++	++	++	++	0	0	++	++
1 cc. of normal saline only.	0	0	0	++	++	++	++	++	++	0	0	++	++

in patients. As the table shows, living emulsions give much better results and can be depended upon to give a positive diagnosis though very little agglutinin be present.

H. S.

PORCELLI-TITONE (F.). Sul valore immunizzante del tetravaccino Castellani: tifo + paratifo A + paratifo B + colera. [The Immunising Value of Castellani's Tetravaccine.]—*Riforma Med.* 1916. Apr. 17. Vol. 32. No. 16. pp. 421-424.

By inoculating two rabbits with CASTELLANI'S tetravaccine and comparing them with two others inoculated, one with typhoid, the other with cholera vaccine, the number of organisms in question being equal in the two cases, the writer demonstrated, as far as demonstration is possible with such a small experiment, that agglutinins and bacteriolysins for typhoid and cholera respectively developed to almost equal extent whether the animal had received the tetra- or the mono-vaccine.

Absorption tests showed that though coagglutinins are formed when the tetravaccine is used, the major portion of the agglutinins present are specific.

H. S.

TARASSENITCH (L.), ALEXINA (L.), GLOTOVA (H.) & FEDOROVITCH (A.). Vaccination mixte contre la fièvre typhoïde et le choléra.—*C. R. Soc. Biol.* 1916. June 17. Vol. 79. No. 12. pp. 564-565.

The authors with experience in a very large number of inoculated soldiers found the local and general reaction no more severe after a mixed than after a simple vaccine. In 453 cases more closely examined, the following agglutinating titres were found after a mixed typhoid and cholera vaccine (250 million typhoid + 500 million cholera per dose) had been given.

Typhoid agglutination.

8 days after 1st inoculation: 26.9 % —; 42 % 1:200 +; 30 % 1:800 +
After the 2nd inoculation: 10 % —; 26 % 1:200 +; 63 % 1:800 +
After the 3rd inoculation all were positive at 1:800 or 1:1000.

The cholera agglutinations never went so high—after the third inoculation 48 per cent. 1:200 +.

Similarly the typhoid agglutinins remained demonstrable in the serum for a longer period.

H. S.

COMBIESCU (D.) & BALTEANU (J.). Recherches sur les vaccinations mixtes Typho-Paratypho-Cholérique chez l'homme.—*C. R. Soc. Biol.* 1916. June 3. Vol. 79. No. 11. pp. 548-550.

The paper describes an investigation into the use of a variety of typhoid, paratyphoid and cholera vaccines, given mixed, singly and in varying quantities to different groups of men. Beyond saying that a multivaccine produces no greater reactions, either locally or generally, than a vaccine containing but one strain, the authors give no results, having apparently forgotten to include them.

H. S.

PARHON (C. J.) & BAZGAN (Gr.). **Phénomènes anaphylactiques consécutifs aux revaccinations anticholériques. L'adrénaline dans le traitement de l'anaphylaxie.**—*C. R. Soc. Biol.* 1916. June 3. Vol. 79. No. 11. pp. 506-507.

After inoculating a number of soldiers with cholera for the third time the authors observed anaphylactic symptoms in three of them. In 1913 the men had had 2 and 4 cc. of vaccine with a week's interval, in 1914 the same; the third occasion was in 1915 when 4 cc. was given.

The first and most severe case is described as follows :—The symptoms set in 20 minutes after the inoculation with a sharp pain in the side and dyspnoea; although the inspirations were short and rapid, no auscultatory phenomena were observed. The face was very pale; there was great sweating; pulse, small and uneven, 120 per minute, after five minutes hardly perceptible. Extremities cold and cyanosed. Pupils dilated; loss of voice and power in limbs. Treatment consisted of warm drinks, hot bottles, injections of ether and caffeine. Because of its power of raising the blood pressure, adrenaline was thought of and 1 cc. of a 1:1000 solution given subcutaneously 15 minutes after the onset of the symptoms, the other remedies not having benefitted. The condition rapidly improved.

The other two cases were less marked, the symptoms beginning 30 and 45 minutes respectively after the inoculation. One cc. of adrenaline was given at once in these cases and without any other treatment the phenomena rapidly disappeared.

The authors could find no reason for just these three men developing the symptoms and suggest that there might have been some latent suprarenal insufficiency.

H. S.

KUTSCHER (Fr.) & PETERS. **Der Nachweis eines Vibrio in ruhrverdächtigem Stuhl.** [The Discovery of a Vibrio in a Dysentery Suspect Stool.]—*München. Med. Woch.* 1916. Jan. 18. Vol. 63. No. 3. p. 76.

A soldier who was said to have had dysentery attacks in 1914 and the early part of 1915, presented the symptoms of the same disease later in 1915. His serum gave the following agglutinations :—

Serum dilutions	$\frac{1}{10}$	$\frac{1}{100}$	$\frac{1}{200}$
B. dys. Kruse	+++	+++	+++
„ „ Flexner	+++	+++	+
„ „ Y	+++	+++	++
„ typhosus	++	+	+
„ paratyphosus B	++	0	0

The man had been inoculated with typhoid and cholera vaccine.

In his stools however the only abnormal organism that could be isolated was a cholera-like vibrio.

H. S.

CASTELLANI (Aldo). **Paracholera.**—*Brit. Med. Jl.* 1916. Mar. 25. pp. 448-449.

A plea for the use of the term paracholera in cases clinically similar to cholera, but from which only cholera-like vibrios can be isolated. The sugar and other reactions of three strains of *V. kergallensis* (or *paracholerae*) are compared with a series of true cholera strains and the independence of their serological reactions demonstrated in an agglutination table.

H. S.

HELMINTHIASIS.

NAKAGAWA (Koan). **The Mode of Infection in Pulmonary Distomiasis. Certain Fresh-water Crabs as Intermediate Hosts of *Paragonimus westermanii*.**—*Jl. Infect. Dis.* 1916. Feb. Vol. 18. No. 2. pp. 131-142. With 2 maps and 4 plates.

For the past ten years Nakagawa has been carrying out investigations regarding the life-cycle of *Paragonimus westermanii* in Formosa, and in this paper he gives an account of the results which he has obtained. A careful study of the distribution of the disease was made and in the course of that study he found that about 73 per cent. of the cases in Formosa were residents in the Shinchiku Prefecture. From these figures he deduced that that Prefecture was the centre of infection and his appointment to the Public Hospital at Shinchiku placed him in the most favourable position for carrying out his investigations. From the fresh-water molluscs, obtained from the streams and ponds in the region where pulmonary distomiasis exists as an endemic disease, he succeeded in obtaining seventeen different cercariae. As he was unable to distinguish which of these was the cercaria for which he sought, he reversed the procedure and placed various kinds of molluscs into water infected with the miracidia of the lung fluke. He states that the miracidia chiefly infested *Melania libertina* and *Melania obliquegranosa*, and from this result he assumes that these two species of fresh-water molluscs are the first intermediate hosts of the lung distomes. The cercaria is described as being 0.12 mm. long and 0.09 mm. broad with a tail 0.054 mm. in length.

"Attached to the oral sucker (0.036×0.032 mm.) are two pear-shaped bodies, the apices of which point towards the median plane of the body. The sucker has spines, each provided with a ring along its anterior edge. The ventral sucker is much smaller than the oral one, being 0.018 mm. in diameter. Within the parenchyma are three pairs of poison glands. The excretory vesicle is heart-shaped."

Stimulated by KOBAYASHI's work on *C. sinensis* [see below], he selected "a region of the Shinchiku Prefecture where patients are abundant" and commenced to collect molluscs, fishes, amphibians and insects with a view to the discovery of the second intermediate host. It was not until September, 1914, that a fresh-water crab, with numerous half-grown larval trematodes encysted in the liver, caused him to broaden his investigations so as to include these crustacea in his researches. Further investigation resulted in his finding fully-grown larval trematodes, possessing all the morphological structures peculiar to the lung fluke, in the gills of some of these crabs.

Apart from a conspicuous, large, black excretory vesicle, and comparatively large oral and ventral suckers, the structure of the younger forms, found encysted in the liver, is not well-marked. In the case of the fully-grown encysted forms, found in the gills, the relationship between larval and adult forms is apparent. The measurement of the fully-grown larva is given as 0.3-0.4 mm. in diameter. This is surrounded by a cyst wall 0.01 mm. thick—"a characteristic feature of the species." The larva has a short and thick body and lies straight—unlike others, which are contorted when lying in the cyst. The entire body is covered with short spines. The oral sucker is furnished

with a spine and is 0.08-0.11 mm. in diameter. The ventral sucker is slightly larger than the oral and measures 0.07-0.12 mm. in diameter. The oesophagus is short and leads into a bifurcated, thick, undulating intestine. The bifurcations run external and parallel to the long, thick excretory vesicle. The fresh-water crabs, in which the encysted larvae were found, are :—

1. *Potamon obtusipes* (Stimpson).
2. *Potamon dehaanii* (White).
3. *Eriocheir japonicus* (De Haan).

The author regards the first and second species as the *second intermediate hosts* of the lung fluke and, in view of the fact that the second species occurs outside Formosa, considers it probable that it functions as such in Japan proper.

The third species of crab was found infected with encysted larvae in only two out of 330 specimens, and the author is uncertain as to whether the attachment to these crabs is not to be regarded as accidental.

With reference to *P. obtusipes* the author states that it "is most abundant in the rivulets and creeks running through the mountainous regions of the Shinchiku Prefecture," and that in one locality "where 30-50 per cent. of the inhabitants are found to harbour the parasites in their lungs, 100 per cent. of these crabs carry the encysted larvae."

Feeding experiments on puppies, obtained from a district where pulmonary distomiasis is unknown, were carried out. In the first series two puppies were used and fed upon the "liver, gills and other organs" of infected crabs. One of these died sixty days after ingesting the infected material and was found to contain a number of cysts in the lungs; each cyst containing two or three immature flukes. The second puppy died ninety days after the experimental meal and in its lungs were found numerous cysts in which were adult distomes, with eggs ready to be discharged.

The experiment was repeated with three puppies at Shinchiku and in this case two were "fed with a large quantity of the internal organs of crabs, while the other was left untreated as control."

The two animals died fifty days after and were both found to be infected, whilst the "control" puppy was found to be free.

In order to work out the route taken by the larval trematode in its journey from the stomach to the lungs, a further series of puppies and kittens were fed upon infected crab-flesh and killed at varying periods of time. The course appears to be that, after having escaped from the cyst, the larva makes its way through the intestinal wall, near the jejunum, and reaches the abdominal cavity. It then crosses the abdominal cavity, perforates the diaphragm and reaches the thoracic cavity. Travelling beneath the pleura the larva reaches and pierces the parenchyma of the lung, and there the cysts are formed. The author also states:—"These parasites can bore through various

tissues and may reach other organs than the lungs, where they form their regular cysts, but the lungs seems to be the most favourable place for their development and the laying of their eggs. In other organs they can never reach the perfect growth."

This article is illustrated by two maps and four excellent plates.*

R. P. Cockin.

SADAO YOSHIDA. **On the Intermediate Hosts of the Lung Distome, *P. westermani* Kerbert.**—*Jl. Parasit.* 1916. Mar. Vol. 2. No. 3. pp. 111–118. With 1 plate.

Working in Japan, and apparently independently, upon the life-history of *Paragonimus westermani* the author of this article has arrived at results which confirm those published by NAKAGAWA and noted above.

Yoshida finds that in Japan proper the crabs which function as the second intermediate hosts of the lung distome are :—

1. *Potamon dehaanii* (White),
2. *Sesarma dehaanii* (Milne Edwards),
3. *Eriocheir japonicus* (De Haan),

and states that these species can be found in any part of Japan. The first—*P. dehaanii*—is a very common crab in the shallow waters of the mountain streams and is edible. It is eaten both raw and cooked. The second—*S. dehaanii*—is usually found in the "lower parts" of various rivers and the author states that it is not used for food purposes. *Eriocheir japonicus* is a very common crab in the brooks and rivers throughout Japan and it is used as food.

With reference to the distribution of the larvae in the body of the intermediate hosts, the writer finds that the gills, muscles and liver are the sites usually occupied. The distribution varies but slightly according to the species of the host.

In the case of *P. dehaanii* and *P. obtusipes* the larvae are frequently found encysted in the liver and rarely in the gills and muscles, in *S. dehaanii* mainly in the liver and rarely in the gills and in *E. japonicus* chiefly in the gills, muscles and hypodermis and rarely in the liver.

"In the gills they adhere between the lamellae in the case of *P. dehaanii*, but are found only in the blood vessel running through the median line of the upper surface of the gill in the case of *E. japonicus*." In this latter species the larvae are found encysted "not only in the muscles of the trunk, but in the muscle and hypodermis of all the appendages."

Referring to the frequency of occurrence of the larvae in the intermediate host he quotes RYO ANDO as stating that 40–70 per cent. of *P. dehaanii* in the Gifu Prefecture are infected. In the Tokushima and

* It is hoped to obtain permission to reproduce some of these plates in a later number.

Okayama Prefecture the author finds that 70-85 of *E. japonicus* are infected and in the Osaka Prefecture *S. dehaanii* to the extent of "about 20-80 per cent."

The number of cysts in one crab varies considerably according to the species, and even in the same species it varies according to locality and other conditions. In one specimen of *E. japonicus* from Ikuina, in the Tokushima Prefecture, 343 cysts were collected and these were found to be distributed throughout the host-body as follows:—

Gills on both sides	81 cysts.
Body muscles on left side	99 "
Body muscles on right side	109 "
Forceps on right side	19 "
Third leg on right side	12 "
Third leg on left side	23 "

With regard to the morphology of the encysted larvae the author describes them as being almost spherical and measuring from 0.25-0.55 mm. in diameter. "The fully-grown cysts vary between 0.30-0.55 mm. in diameter." The cyst wall is described as being "a transparent chitinous membrane of tolerable thickness." In the fully developed larva the organs can be distinctly recognised and the author points out that the parenchymatous tissue of the body is tinged with "light red pigment." This latter characteristic makes the larvae easily recognisable, even when encysted in liver or muscle.

Feeding experiments were made upon young cats and dogs, which were brought from uninfected districts and carefully examined before being used for this work. Some of these experiments were incomplete when this paper was written. Four of the completed ones are described below:—

1. Young cat. Fed with 20 cysts on July 26th, 80 on the 28th and 130 on August 2nd. These cysts were all obtained from the gills of *E. japonicus* [Tokushima Prefecture]. The cat died August 10th and in the abdominal cavity eighteen young worms, "floating in serous fluid and adhering to the omentum, mesentery and inner surface of the abdominal wall," were found. In the pleural cavity, sixteen worms "in the serous fluid and on the pleural membrane" were also found. These young distomes measured from 1-2 mm. and had not yet occupied the lungs.

2. Young cat. Fed with 80 cysts on August 7th and killed on August 17th. Cysts obtained from gills of *E. japonicus* [Tokushima Prefecture]. Five worms found in the abdominal cavity and six in the pleural. These measured 1 mm. in length and 0.5 mm. in breadth.

3. Young dog. Fed with 33 cysts on August 14th, 46 on the 17th, 90 on the 28th, 50 on the 30th and 32 on September 1st. The cysts of the first two feeds were obtained from the gills of *E. japonicus* [Tokushima Prefecture] and the remaining cysts from *S. dehaanii* [Osaka Prefecture]. The dog died September 29th and at the subsequent examination, numerous perforations on the inner surface of the abdominal body wall and on the surface of the diaphragm were observed. In the abdominal cavity thirty, and in the pleural cavity forty-three young worms were found. In the latter situation they were noted "in the serous fluid and on the surfaces of various organs; lungs, heart, and pleural membrane." Yoshida states that, in this case, he found a good specimen which demonstrates "that the worm in the pleural cavity enters the lungs from its surface by perforating." In fixed specimens, the measurements of the worms in this case are given as varying from 1.5-5 mm. in length and 0.5-2 mm. in breadth. Numerous worms, in various stages of development, were observed in the lungs.

4. Young cat. Fed with four cysts on June 15th, one on 16th, and three on 17th; killed August 17th. All the cysts used were taken from the liver of *S. dehaanii*. At the post-mortem examination two young distomes were found. One of these was in the pleural cavity, the other in the right lung. The measurements of these worms are given as 4 mm. long and 2 mm. broad. The latter specimen was immature.

The account given by Yoshida of the route taken by the larva, in its journey from the stomach to the lung in the definitive host, agrees with that which is noted in NAKAGAWA's paper. He, however, adds that, in addition to the usual course, the young distomes "may penetrate the abdominal wall and move about in the muscular layers of the connective tissue."

Some worms, in the pleural cavity, may even travel headwards in the loose connective tissue around the oesophagus and great vessels.

The author considers that this discovery of the wandering character of the young fluke affords an explanation of cerebral and spinal paragonimiasis which was not supplied by former theories.

A plate illustrates the article.

R. P. C.

KOBAYASHI (H.). *On the Life-History and Morphology of Clonorchis sinensis*.—*Cent. f. Bakt.* 1. Abt. Orig. 1915. Jan. 13. Vol. 75. No. 4. pp. 299-318. With 4 plates.

In this article the author amplifies the preliminary report on this subject which was noted in a previous issue of this *Bulletin* [Vol. 1, pp. 429-430]. He states that whilst employed in the study of the developmental stages of trematodes in fresh-water molluscs, fishes and other aquatic fauna, he found that one species of young distome, encysted in the muscular tissue of certain of the fresh-water fish, coincided exactly in its distribution with that of human liver distomiasis. The distome, moreover, bore a striking resemblance to the liver distome met with in Japan.

He finds that these encysted distomes are found in the following species of fish:—

- | | |
|--|--|
| 1. <i>Pseudorasbora parva</i> . | 7. <i>Acheilognathus lanceolatum</i> . |
| 2. <i>Leucogobio guntheri</i> . | 8. <i>Acheilognathus limbatus</i> . |
| 3. <i>Leucogobio</i> Jordan & Snyder. | 9. <i>Acheilognathus cyanostigma</i> |
| 4. <i>Sarcocheilichthys variegatus</i> . | 10. <i>Abbottina psegma</i> . |
| 5. <i>Pseudoperilampus typus</i> . | 11. <i>Biwia zezera</i> . |
| 6. <i>Paracheilognathus rhombeum</i> . | 12. <i>Carassius auratus</i> . |

The distribution of the cysts in the above hosts appears to be restricted to the subcutaneous tissues and muscles, and they are usually found to be more numerous in the superficial than in the deeper tissues. The myocommata have, apparently, no influence upon the distribution of the cysts in the muscle. The cysts are 0.135-0.145 mm. in length by 0.09-0.1 mm. in breadth. The cyst wall is thin, hyaline and structureless and, when *in situ*, is surrounded by a layer of cells, the product of the activity of the host. The structure of the encysted distome varies slightly according to its age. In the early forms eye-spots are seen, but these disappear as growth proceeds. The measurements of a fully-developed, fresh specimen are given as 0.4-0.5 mm. in length by 0.08-0.09 mm. in breadth. The cuticle is armed with fine

spines and the encysted distome is bent upon itself in the long axis of the cyst. The size of the suckers, consequently, depends upon the degree of contraction which obtains.

In the cyst the larval distome may occasionally be seen to make movements of a rotatory character but, when taken out of the cyst, it creeps about in a leech-like fashion; slowly at room temperature and more actively when the temperature is raised. The author notes that these cysts can be found in the fish throughout the year, but that the younger ones are more abundantly met with from August to October.

In experimenting with a view to gauging the tenacity of life possessed by the larval distomes, the following results were obtained :—

1. The larvae are killed by heat at 100° C. and approx.
2. Subjection to temperatures of 50°–70° C. for fifteen minutes is insufficient to kill them.
3. Exposure to vinegar and Soya sauce for five hours will not kill them.
4. The larvae will live for several days, at least, when the fish in which they are encysted is kept in a refrigerator.
5. At room temperatures, the larvae die as their host putrefies.

In another series of experiments the author fed thirty cats, one dog, twenty rabbits, forty guinea-pigs and fifty rats with fish containing encysted larvae. In seven days typical *Clonorchis sinensis* were found in all the subjects of the experiment. The development of the young distome and the route followed by the parasite in the final host were ascertained by feeding experiments upon cats which, as in the case of the cats and dog in the above series, were repeatedly examined for ova in the faeces before being utilised for this work.

These cats were killed at varying intervals of time and dissected, and from this series of experiments the following observations were made.

Three hours after the infected fish had been ingested some of the cysts were found to be empty and the liberated distomes were actively creeping about amongst the food-mass with the aid of both suckers. As early as fifteen hours afterwards, free distomes were found both in the gall-bladder and bile duct. The rate of growth is dependent upon the nourishment obtainable, the number of parasites present and the size of the host. If numerous in a small animal they grow more slowly than when few parasites are present in a larger animal. Within twenty-six days after infection the parasites attain maturity and eggs are found in the faeces of the host.

The posterior portion of the body of the distome grows more rapidly than does the anterior, and this the author considers is due to the more rapid development of the genitalia at this stage.

Of the suckers, the oral grows the more rapidly and ultimately becomes the larger, so reversing the condition which obtains during the larval state. The author notes that, for the greater part of the period of growth, the cuticle is furnished with flattened needle-like spines; and that, up to a certain period, increase of spines corresponds with increase of growth. Owing to the less rapid growth of the anterior portion of the body the spines are relatively more numerous in that situation. The oldest specimen which was found to possess spines was removed from a cat which had been fed on infected fish twenty-three days previously.

The usual sites occupied by this fluke in the definitive host are the hepatic ducts, the gall bladder and the bile duct. When the parasites are numerous the greater number of them are found in the fine hepatic ducts, very few being present in the gall bladder. Rarely, specimens occur in the pancreas and duodenum. The hosts of the liver distome hitherto described are man, the dog, the cat, and the pig. The author succeeded in rearing this parasite from larva to adult in the rabbit, the guinea-pig and the rat.

Regarding the first intermediate host, the author is of opinion that the cercarial stage of the life-cycle of this fluke is passed in one of several species of *Melania*, most probably *Melania libertina*. The fact that *Melania* infested with cercariae, which bear a close structural resemblance to the young encysted larvae of *Clonorchis*, are very abundant in the rivers and swamps of those regions where liver distomiasis prevails, supports this view.

A more detailed description of this latter subject is promised upon the completion of experiments which were in progress when this article was written.

An excellent description of the structure of the adult worms is given and the author calls attention to the following facts which have come under his observation :—

1. The first eggs produced by the sexually mature worm are imperfect.
2. The pigmentation (yellow or brownish) of the adult is probably degenerated shell material derived from the yolk cells.
3. Senile degeneration is found in the larger specimens (11–15 mm.). In these senile forms the yolk glands partly or completely disappear, the uterus is empty and the body is pigmented.

He is unable to state what is the period of life of these distomes but the results of his experiments show that some live for at least two years in the final host.

In concluding his article he advances the following reasons why *Clonorchis endemicus* should not be regarded as a species separate from *Clonorchis sinensis* :—

1. The sizes of *C. sinensis* and *C. endemicus* (13–19 mm. and 10–13 mm. respectively) depend upon the size of the host and upon the number of parasites present in the host.

2. Regarding the vitellaria which are described by Looss as being discontinuous (interrupted by several undeveloped portions) in *C. sinensis* and continuous in *C. endemicus*, the author adduces the following descriptions of six specimens in order to demonstrate the inconstancy of this characteristic :—

No.	Host.	Length.	Breadth.	Vitellaria.	Pigment.
1	Cat	18.0 mm.	3.5 mm.	Continuous	No
2	Man	11.0 mm.	2.7 mm.	Continuous	Abundant
3	Man	9.5 mm.	3.0 mm.	One interruption on one side	Abundant
4	Man	11.5 mm.	2.5 mm.	Two interruptions on both sides	No
5	Cat	14.0 mm.	2.5 mm.	One interruption on one side	No
6	Cat	7.5 mm.	2.0 mm.	Several interruptions on both sides	Abundant

3. The common occurrence of yellowish or blackish pigment in the parenchyma of *C. sinensis* and its absence in *C. endemicus* may, in the author's opinion, be due to age and partly to senile changes. The larger worms being usually the older.

4. Regarding Looss's contention that in *C. sinensis* the egg narrows more distinctly anteriorly and has a higher lid with a more projecting rim than that of *C. endemicus*, the author states that he has noticed that the exact reverse is the case. In an egg from a specimen (10 mm.) taken from a cat the shell tapered considerably anteriorly and was provided with a distinctly vaulted lid, whilst in one taken from a specimen (14 mm.) the shell tapered considerably less and was furnished with a relatively flat lid. He has noted these differences so frequently that he cannot consider them to be exceptional.

R. P. C.

FISCHER (Walther). *Ueber die Eier von Clonorchis sinensis*. [The Egg of *Clonorchis sinensis*.]—*Arch. f. Schiff- u. Trop.-Hyg.* 1915. July. Vol. 19. No. 13. pp. 358-361.

The Chinese population of Shanghai is stated by the author to be infected with *C. sinensis* to the extent of six per cent. This figure was obtained as the result of the examination of 128 cases.

With reference to the eggs of *C. sinensis*, Fischer gives the average length as 29.6μ and the average breadth as 15.4μ . Considerable variations were noted in the length of individual specimens. The smallest specimen examined had a length of 22.6μ and the largest of 33.8μ .

The measurements recorded by other observers may be summarised thus :—

Observers.	Length.	Breadth.
Braun	29 microns	16 microns
Jeffery and Maxwell ..	27 "	15 "
Looss	24-25 "	15 "

Fischer points out that the breadth of the egg is approximately the same in all the recorded figures.

R. P. C.

CAWSTON (F. G.). i. *Schistosomiasis in Natal*.—*S. African Med. Rec.* 1916. Feb. 26. Vol. 14. No. 4. pp. 53-54.

ii. *Bilharziosis in South Africa*. *Ibid.* Apr. 8. No. 7. pp. 99-105.

The former of the above articles gives an account of the author's work on the life-cycle of *S. haematobium* which was carried out in Natal and which has already been noted in this *Bulletin* [Vol. 7, pp. 348-349].

In the second article, a general account of all the recent work on this subject is detailed and much interesting information regarding the disease as it manifests itself in South Africa is recorded.

With regard to the South African type of bilharziasis the author states that " it is most exceptional to hear of cases which could be said to have died or to have had their lives shortened by bilharziasis in

South Africa." He also adds that "one can with impunity recommend an insurance company to accept for life insurance at the usual rates an otherwise suitable applicant who has a previous history of bilharziasis" provided that blood and mucus have been absent from the urine for twelve months and the ova for six months.

Whilst Cawston considers that the South African type of bilharziasis is "by no means the serious disease which is reported from Egypt," he admits that one occasionally does meet with serious symptoms in the cases there, "which may be attributed indirectly to bilharziasis." The occurrence of gravel and stone, he states, amongst patients giving a history of this disease, is more common than in the case of those uninfected with bilharzia, and "there is evidence to prove that, in some instances, the ova do form nuclei for gravel or stone in the kidney substance."

"Very severe haemorrhage from the bladder" and "marked anaemia" are also noted as occurrences in some cases. With reference to treatment, Cawston recommends the use of hexamine, and he states that he has been struck with the marked improvement which is noticeable in cases after the administration of hexamine and buchu.

In those cases where the urine is alkaline, he suggests that "an occasional dose" of sodium acetate should be administered alternately with the hexamine. Sodium acetate and hexamine "should not be combined in the same dose."

R. P. C.

CAWSTON (F. G.). i. **The Cause and Effect of Bilharzia Disease in South Africa, Egypt, and the Far East.**—*S. African Med. Rec.* 1916. June 10. Vol. 14. No. 11. pp. 163-164.

ii. **The Prevention of Bilharzia Infection.** [Correspondence.]—*Lancet.* 1916. July 15. p. 121.

i. In this note Cawston states that he has found the Bilharzia cercaria in 13 out of 92 specimens of *Physopsis africana*, collected from the Toll Gate brickfields at Durban, and in 4 out of 367 specimens of the same mollusc obtained from the Umsinduzi River.

Of 19 specimens of *P. africana* exposed to infection with miracidia, from the urine of a bilharziasis patient, seven "contained cercariae with bifid tails" when examined. "Similar experiments with *Limnaea* and *Planorbis* have proved entirely negative."

ii. Writing on May 13th 1916, Cawston states that "at this period of the year" 19 per cent. of the fresh-water molluscs of Natal are infected with cercariae. This figure is arrived at as the result of the examination of 596 molluscs, of which 116 were found to be infected. Of the infected snails, 76 harboured "tadpole" cercariae, and 40 cercariae with bifid tails. The bifid-tailed cercariae were of five varieties. "The cercariae which answer to the description of those which cause bilharzia in man and beast in Egypt and the Far East are the more common of the forms with bifid tails met with in Natal." Of the *Physopsis* collected at Durban, 14 per cent. were infected with these latter cercariae; and, of those from the Umsinduzi River, 15 per cent.

R. P. C.

- CAWSTON (F. G.). i. **The Prevention of Bilharzia Infection.** [Correspondence].—*Lancet*. 1916. Apr. 15. p. 837.
 ii. **The Causes of Bilharziosis.**—*Med. Jl. S. Africa*. 1916. Feb. Vol. 11. No. 7. pp. 125–126.

In both the above notes Cawston advances the opinion that the time has arrived when measures, with a view to preventing the spread of bilharziasis, should be instituted. He points out that a great amount of information, regarding the life-cycle of the Schistosome worms producing this disease, is now available, and suggests that the application of this knowledge promises success for the preventive measures undertaken.

He considers that the measures should be directed mainly to two ends:—

1. The prevention of the contamination of bathing pools and drinking water by infected urine.

2. The removal of the intermediate hosts [certain molluscs] from places where they are exposed to infection.

He notes the significant distribution of a dark sinistral snail, *Physopsis africana*, in Natal and its presence in bathing pools which are known "to be associated with Bilharzia infection" [see also this *Bulletin*, Vol. 7, p. 348].

R. P. C.

- BECKER (J. G.). **A Preliminary Note on an Intermediate Host of *Bilharzia haematobium* in the Transvaal, together with a Description of the Cercariae with which the Mollusc is infected.**—*Med. Jl. of S. Africa*. 1916. Apr. Vol. 11. No. 9. p. 156. With 1 plate.

Acting on the advice of Dr. WATKINS-PITCHFORD, the writer collected fresh-water snails from the bathing-pool at Nijlstroom, Transvaal, which was known to be a source of infection to the children who bathed there.

Thirty-six specimens were collected and Dr. E. WARREN, of the Natal Government Museum, identified thirteen of these as *Physopsis africana* and twenty-three as being a species of *Limnaea*—possibly *L. natalensis*. Three of the molluscs of the former species were found to be heavily infected, whilst in the latter "not a single infected individual was discovered."

The cercariae obtained from the infected specimens possess a bifurcated tail and are described as measuring "approximately 0.5 mm. (body 0.185, tail 0.225, prong 0.09)." The writer was unable to detect either a pharynx or eye-spots.

He confirms LEIPER's observation that the cercariae do not live longer than about two days in water, and adds that "the great majority shed their tails before dying."

R. P. C.

- MINET (H.). **Deux cas de Bilharziose vésicale provenant de l'Afrique Septentrionale française.**—*Ann. des Maladies Vén.* 1915. July. Vol. 10. No. 7. pp. 385–396. With 1 coloured plate.

In this article the writer deals with the pathological lesions in vesical bilharziasis, as observed by means of the cystoscope. The observations were made on two soldiers who were suffering from the

disease; one of these coming from Sousse (Tunis), the other from Merrakech (Morocco). The latter had, however, lived for the past eight years at Oran in Algeria, and it is doubtful whether the disease was contracted in Morocco or at Oran.

Both patients exhibited one symptom of the disease—haematuria; and neither complained of pain or frequency of micturition. The soldier from Tunis was recognised as being an early case, whilst the patient from Oran was noted as a more advanced stage of the disease.

Upon cystoscopic examination the only pathological feature observed, in the bladder of the former case, was slight vascularisation of the mucosa. In the latter case pathological lesions of three types were noted, which may be summarised as follows:—

(a) *Small yellow granulations*: These are described by the author as “absolutely characteristic of vesical bilharziasis.” In appearance they are likened to *grains of millet* and consist of small prominences of normal mucosa surmounted by a yellow cap.

The granulations which occur in tuberculosis of the bladder are pale yellow, hemispherical vesicles which lie on a flat background of inflamed mucosa, and may be distinguished by these features.

(b) *Infiltrated swellings of the mucosa*: In the early stages these are described as having the appearance of folds of normal mucosa. The surface of these rugae is not infrequently studded with the small yellow granulations described above. Later, vascularisation of the mucosa covering these folds takes place and intense congestion can, subsequently, be observed. The author calls attention to the fact that the vascularisation and subsequent congestion are restricted to the infiltrated areas. In those cases in which cystitis is superadded, this restriction would not be seen.

(c) *Fungating vegetations of the mucosa*: These resemble the exuberant granulations which are occasionally seen in wounds. They form sessile tumours as large as the rugae just described, and of which they are the ultimate stage. It was possible in some instances, by following a fold along its course, to observe the gradual transition from infiltrated and congested mucosa to the fungating stage.

A coloured plate, which illustrates the points noted by the author, is attached to this article and should be referred to by those doing cystoscopic work in countries where bilharziasis is met with.

R. P. C.

BURRES (W. T.). *Intestinal Bilharziosis in Western Panama.*—*Amer. Jl. Trop. Dis. & Prevent. Med.* 1916. May. Vol. 3. No. 11. pp. 611-612.

Although cases of intestinal bilharziasis are of comparatively rare occurrence in the Canal Zone, the writer considers it likely that the introduction of these occasional cases will eventually result in the permanent establishment of the disease in the country.

He states that the records of the U.S. Government Hospital at Ancon show that fifty-eight cases of the disease have been observed in the Canal Zone from 1905-1913 inclusive; and, so far as he was able to learn, all of these, with one exception, were West Indian negroes. The one exception was a white Spanish woman, who was not a native of Panama.

The writer states that, in the Province of Chiriqui (250 miles west of Panama City), he found the eggs of *S. mansoni* in the stool of a negress from St. Lucia. He explained the nature of the case to the authorities and obtained their promise "to either isolate or deport the woman."

R. P. C.

RISQUEZ (Jesús Rafael). **Nota preliminar sobre la Anatomía patológica de la Bilharziosis en Venezuela.** [Preliminary Notes on the Pathological Anatomy of Bilharziasis in Venezuela.]—*Gaceta Med. de Caracas*. 1916. Feb. 29. Vol. 23. No. 4. pp. 25-26.

In a series of eighty-six post mortem examinations, made at the Hospital Vargas, Caracas, the author found nineteen of these to be infected with bilharziasis. The notes on these latter cases are summarised as follows:—

1. The proportion of cases infected with *Schistosoma mansoni* was about 22 per cent. of the whole series, and of these the majority were females.

2. The greater number of the cases were between the ages of 20-40 years, and the majority were born in Caracas.

3. The whites were infected three times as frequently as the half-castes. [Indians and Negroes were not represented in the statistics.]

4. The following lesions were found associated with bilharziasis:—

- | | |
|--|-----------|
| (a) Pulmonary and pleural lesions on five occasions. | |
| (b) Hepatic | " " " " |
| (c) Cardiac | " " two " |
| (d) Gastric | " " " " |
| (e) Renal | " " " " |
| (f) Syphilitic | " " " " |
| (g) Intestinal (enteritis) | " " one " |

5. The pleura was adherent on the right side as a rule, and the majority of the cases showed cirrhosis of the liver.

6. The size of the liver appears to be proportional to that of the spleen, except in those cases in which other aetiological factors have previously affected these organs.

7. In no case were the classical lesions, described as occurring in this disease, met with; and papillomatous tumours in the bowel were not observed.

8. The transverse and descending colon were usually found to be diminished in calibre and the mucosa was, more or less, extensively spotted with small, circumscribed punctiform haemorrhages. Ulcers of medium depth and haemorrhoidal masses were also present. In some cases these latter were also ulcerated.

9. The presence of hypertrophied glands in the gastro-hepatic omentum was relatively constant. At times these were also noted at the roots of the lungs.

10. Adhesions of that portion of the peritoneum which envelops the great intestine were frequently noted. This was always the case when the calibre of the gut was diminished.

R. P. C.

Post (D. C.). **Salvarsan in the Treatment of Schistosomiasis. Report of a Case.**—*U.S. Naval Med. Bull.* 1915. Oct. Vol. 9. No. 4. pp. 645-650.

Post, in the above paper, gives the clinical history of a case of Asiatic schistosomiasis, occurring in one of the members of the hospital staff of the U.S.S. "Palos."

The case was for a considerable time under treatment before the ova of *Schistosoma japonicum* were found in the faeces, and during that period the diagnosis was in doubt.

Eosinophilia was present, throughout the course of the disease, to the extent of 10-12 per cent. of the total leucocyte count.

The case was treated by the intravenous injection of 0.6 gm. salvarsan and within a month the patient had nearly recovered his normal condition. Further examinations of the faeces for ova were negative.

The author gives the following advice to those searching for the eggs of *S. japonicum*.

A rather hard stool should be taken and it should be examined in the state in which it was passed, without admixture of urine, water or disinfectants. A search should be made on the top and in the cracks of the stool for the little threads of mucus, frequently blood-stained, which contain the eggs.

[The U.S.S. "Palos" patrols the Yang-tse River and so traverses a region throughout which Asiatic schistosomiasis is endemic.]

R. P. C.

SCHRECKER. **Ueber Salvarsanbehandlung bei Bilharziosis.** [The Treatment of Bilharziosis with Salvarsan.]—*Arch. f. Schiff's- u. Trop.-Hyg.* 1915. Mar. Vol. 19. No. 5. pp. 149-150.

The author of this note is not convinced that intravenous injections of salvarsan in the treatment of bilharziosis are of any service.

He records eight cases—four long-standing and four recent—which he had treated by this method, and in only two of these did Bilharzia ova even temporarily disappear from the urine. In the remaining six cases no change was noted, eggs and blood being constantly present. In the two cases, in which temporary disappearance of eggs was noted, blood continued to be present throughout the whole period of observation.

R. P. C.

ROBERTSON (Wm.). **Thymo-Benzene in Bilharziosis.** [Correspondence.] *Lancet.* 1916. Mar. 25. p. 698.

Writing from Cape Province, South Africa, Robertson calls attention to the excellent results obtained, by the use of thymo-benzene, in the treatment of bilharziosis. The dose he recommends is thymol, 2 grains dissolved in half a drachm of benzene, and he states that in such doses the ova are passed in great numbers, "the majority being black." This change in the appearance of the ova he regards as a degenerative one.

Continuation of this treatment causes abatement of all subjective and objective symptoms, and in a few weeks, in mild cases, no ova can be found in the urine on repeated examination.

In graver cases such good results are not obtained, although, even in these, there is marked improvement in the general condition in spite of persistence of the ova in the urine.

The author states that he knows of no other mode of treatment which yields such good results in this disease; and, he adds that, in such doses as that referred to above, no discomfort to the patient is experienced.

[EKINS obtained most unsatisfactory results in the treatment of four cases of bilharziasis, at Alexandria, from the use of this drug (see this *Bulletin*, Vol. 6, p. 300). EKINS'S doses were, however, considerably larger than those recommended by Robertson.]

R. P. C.

SINGER (J. J.). *A Case of Bothriocephalus latus Infection.*—*Jl. Amer. Med. Assoc.* 1916. May 20. Vol. 66. No. 21. pp. 1618-1619.

Singer reports, in this note, the occurrence of a case of *Bothriocephalus latus* infection in a female patient at St. Louis, U.S.A. The patient was a native of Vilna, Russia, and had been passing segments of tapeworm at intervals for the past four years. Sixteen years previously she passed a tapeworm, fifteen feet in length, after the administration of an anthelmintic. A sister and her mother had both been the subjects of tapeworm infection.

The treatment adopted in the present instance consisted of the administration of 10 gr. capsules of male fern at intervals of half an hour for six doses. Two ounces of castor oil were given on the night before the administration of the male fern, and a further two ounces four hours after the last capsule had been taken.

The worm recovered measured twenty-seven feet and included the head.

Singer notes that *Bothriocephalus* infection is comparatively rare in the United States, only thirty cases having been reported up to date. In only one of these was the patient American born, a boy of Finnish parentage. The author quotes NICHORSON as stating that he has frequently found the larvae of *B. latus* in fish caught in the Great Lakes, and that the method of preparing fish for food in the United States accounts for its relative rarity there.

R. P. C.

STEWART (F. H.). *Hymenolepis nana* (Siebold) (The Dwarf Tapeworm). as a Parasite of Indian Soldiers.—*Indian Med. Gaz.* 1916. June. Vol. 51. No. 6. pp. 218-219. With 2 figs.

In this note the writer records that he found the ova of *H. nana* present in the faeces of eight sepoy of the Indian garrison at Hong Kong, out of a series of 320 men from whom specimens were examined.

Of the eight men, two were Punjabi Mahomedans and six were Dogras. No symptoms which could be attributed to the presence of the parasite were noted in any of the cases. In one of the men perityphlitis coexisted with the cestode infection, but Stewart appears to be

inclined to regard the association as accidental. The eggs were recovered by filtration through muslin and sedimentation of the filtrate. The measurement of the outer shell of the egg is given as 0.07 mm. in diameter. Stewart considers that the accounts of the anatomy of this parasite which have hitherto been published are inaccurate and he promises "a full account of this interesting subject based upon a large supply of material" in the near future.

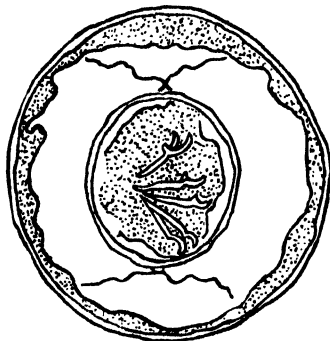


Fig. 1.

Egg of *H. nana* $\times 650$.

Fig. 2.

Strobila,
natural size.

In treating the cases, the author found *Oleum chenopodii* more effective than *Filix mas* [doses not stated]; "heads" being more frequently recovered after the administration of the former drug.

R. P. C.

WARD (J. La Bruce). **Diagnosis in Hookworm Diseases.**—*Southern Med. J.* 1915. Sept. 1. Vol. 8. No. 9. pp. 745-750.

The writer of this paper is of opinion that microscopical examination of the faeces is essential for the diagnosis of hookworm infection. He considers that "there is no other disease which is so insidious or which has symptoms so numerous and so protean."

BASS is cited as stating that "the combination of characteristic anaemia, associated with under-development, weakness, dilated heart and a history of ground-itch is not likely to be confounded with anything else." This statement the author considers correct, but points out that such a combination of symptoms is only met with in extreme cases, "and these are by no means in the majority."

The author's conclusions are :—

1. That hookworm disease is one of the most prevalent and the most important diseases with which the physicians of the Southern States have to deal.
2. That a reliable diagnosis cannot be made without a microscopical examination of the faeces.
3. That an examination of the faeces should be included in the routine of every hospital.
4. That the physicians of the Southern States should suspect the presence of hookworm infection "regardless of symptoms or their absence."

R. P. C.

MACDOWELL (Affonso). Da ictericia na ankylostomias e da sua pathogenia.—*Arch. Brasileiros de Med.* 1915. Apr.–Mar. Vol. 5. Nos. 4–5. pp. 189–197.

After discussing the rarity of jaundice in ankylostomiasis and calling attention to the scant notice which this subject has received in the literature, the author summarises his conclusions regarding it as follows :—

1. Jaundice is a rare occurrence in the course of ankylostomiasis, in spite of the great amount of blood destruction which takes place.

2. The spleen and liver are only exceptionally enlarged in this disease.

3. The lack of haemolytic power possessed by the spleen in this parasitosis explains the clinical rarity of the icteric form.

4. When a haemolytic jaundice is met with in ankylostomiasis it is always accompanied by hyperplasia, and consequent enlargement of both the spleen and liver.

R. P. C.

i. **FECHTIG (A. J.) & WALKER (J. E.). Hookworm History Schedules of Two Patients treated with Thymol.**—*Texas State Jl. Med.* 1916. Mar. Vol. 11. No. 11. pp. 602–603.

ii. **GRAVE (Floyd) & SLATER (H. M.). Hookworm History Schedules of Two Male Patients treated with Thymol at the U.S. Marine Hospital, Wilmington, N.C.**—*New Orleans Med. & Surg. Jl.* 1916. Apr. Vol. 68. No. 10. pp. 629–638.

In a note attached to both the above articles, Professor C. W. STILES states that the chief object in their publication is to demonstrate the schedule method for taking the clinical histories of patients with parasitic infections, which has been in use for several years at the U.S. Marine Hospital, Wilmington, North Carolina. Professor STILES adds :—

“There is nothing new in principle in the plan, but so far as can be judged from the literature on hookworm disease, its application and details represent several departures from usual procedures.

“The schedules have the advantage of greater uniformity and completeness, so that in a large series of cases the separate symptoms can be more easily compared than is usually the result in clinical histories taken by different observers.”

R. P. C.

HEISER (Victor G.). Are there Harmful and Harmless Hookworm Infections?—*Jl. Sociolog. Med.* 1916. Feb. Vol. 17, No. 1. Whole No. 151. pp. 37–40.

In this paper the writer suggests the possibility of there being two varieties of hookworm infection—the one harmful, the other harmless. In support of his contention he instances the cases of Bilibid Prison and the towns of Tay Tay, Las Pinas and Tuguegarao, all of which are in the Philippines.

In the first of these 3,000 prisoners are confined; and, previous to treatment for the expulsion of hookworms being undertaken, the death-rate amongst them was 80 per thousand per annum. Subsequent to treatment, the death-rate fell to 12 per thousand per annum.

The same treatment, when applied to the populations of the towns named above, failed to produce any alteration in the death-rate—[25,000 cases treated]. [The conditions under which the two groups lived, subsequent to treatment and during treatment, in addition to the small possibility of reinfection which existed for prisoners living under the ideal hygienic surroundings which the writer cites, would appear to explain to some extent the results obtained. The death-rate, before and after treatment, of the civilian populations is not given.]

R. P. C.

GUNN (Herbert). **The Control of Hookworm Disease by the Pacific Mail Steamship Company.**—*Jl. Sociolog. Med.* 1916. Feb. Vol. 17. No. 1. Whole No. 151. pp. 16-26.

In 1912, the United States authorities issued an order requiring a medical certificate showing that aliens, coming from hookworm infected districts, were free from that parasite upon disembarkation in the United States. A fine of one hundred dollars was imposed, by the authorities, upon any steamship company which failed to comply with this regulation. Consequently, the Pacific Mail Steamship Company decided to employ a representative in Hong Kong to examine cases before embarkation. Those cases which were found to be infected were treated by the ship's surgeon during the voyage.

The writer states that this method has worked out quite satisfactorily, and that only about three per cent. of the cases treated are found to be infected upon their arrival at San Francisco.

The procedure adopted, in the case of adults in good condition, is to give thymol (grs. 80) on two successive days followed by one day's rest. This is repeated, until the daily examination of the stools shows that ova are no longer present. As soon as the microscopical examination of the stool is negative, the treatment is discontinued. The writer states that the average length of time required for a "cure" is about seven days. In the majority of cases this form of treatment was efficacious, but in intractable cases heroic measures were adopted. The following is a case in point:—

"Leaving Hong Kong June 26th and arriving in San Francisco July 25th:—

June 27	..	..	Thymol, grs. 80.
June 28	..	..	Rest.
June 29, 30 and July 1	..	..	Thymol, grs. 80 daily.
July 2 and 3	..	..	Rest.
July 4 and 5	..	..	Thymol, grs. 80 daily.

On account of bad weather after Yokohama, no treatment until:—

July 10-12	..	..	Thymol, grs. 90 daily.
July 13	..	..	Rest.
July 14-17	..	..	Thymol, grs. 100 daily.
July 18	..	..	Rest.
July 19-22	..	..	Thymol, grs. 120 daily."

Thus 1,560 grains of thymol were given in sixteen days, and it was not until the morning of the last treatment that a negative examination for ova was made. Gunn states that he has "used large doses of thymol, often repeated for several days in succession" for some years

past, and has never seen any serious results from its use. He adds "loss of weight from the repeated purging is the only ill-effect that the majority of patients show after a strenuous course of treatment."

Among the 1,776 cases treated by the company there was only one death.

R. P. C.

WHYTE (G. Duncan). Ankylostomiasis: Simplified Diagnosis and Treatment.—*Ann. Trop. Med. & Parasit.* 1916. Apr. 29. Vol. 10. No. 1. pp. 79-84.

The difficulty of determining whether further anthelmintic treatment is necessary, after one course of treatment for the expulsion of hook-worms has been concluded, has prompted the author to place on record the following simple method with a view to its solution.

The test is dependent upon two facts:—“(i) A trace of blood is constantly present in the faeces of ankylostomiasis patients, and (ii) there is a test for blood so sensitive as to reveal its presence in a dilution of 1 in 800,000.”

The method of carrying out the test is as follows:—

“To 2 cc. of a watery solution of faeces is added 1 cc. of the alkaline solution of phenolphthalin (i.e. reduced, and therefore colourless, phenolphthalein) and then one drop of hydrogen peroxide. In the presence of blood some of the phenolphthalin is re-oxidised to phenolphthalein and a bright red colour appears.”

It is, however, necessary before applying the test to exclude the presence of peptic ulcers, haemorrhoids and other gross lesions causing bleeding into the gastro-intestinal tract. In addition, the patient should not have eaten meat or blood for three days previously. [Cockles, “a favourite condiment in Swatow,” will also give the blood reaction if eaten in sufficient quantity.] The author states that “the sensitiveness of the test is shown by the fact that often less than twenty worms were expelled in the last treatment the patient received, i.e., so small a number of ankylostomes were able to give rise to an amount of blood sufficient to be detected by this test.”

The method of treatment, adopted by Dr. Whyte, is summarised as follows:—

On the night previous to the administration of the anthelmintic, the patient is given a light meal at 5 o'clock and two hours later a powder containing calomel (grs. iii), phenolphthalein (grs. ii) and santonin (grs. iv). The following morning, no food is given and the treatment is continued thus:—

At 6.0 a.m.—beta-naphthol	..	..	grs. 40.
„ 8.0 a.m.—beta-naphthol	..	..	grs. 40.
„ 10.0 a.m.—thymol	..	..	grs. 30.
„ 12.0 noon—Mist. Mag. Sulph.	..	..	oz. 1.

The saline aperient is repeated at 3.0 p.m. if the bowels have not acted by that time.

If the patient chooses to return home that evening, he is permitted to do so. He presents himself at the hospital on the next out-patient day.

The author states that the combination of thymol with beta-naphthol is more efficient than the latter drug used singly and "causes less anxiety than the administration of 90 grains of thymol."

R. P. C.

CORTELING (O. R.). Beta-naphthol in Ankylostomiasis.—*Indian Med. Gaz.* 1916. Mar. Vol. 51. No. 3. pp. 98–99.

Notes on the case of a Javanese, in British North Borneo, who was treated for ankylostomiasis with three 30 grs. doses of beta-naphthol.

On the third day after the administration of the drug, vomiting accompanied by headache set in. The temperature remained normal. The conjunctivae were deeply jaundiced and the urine was dark red in colour—"obviously due to blood." An examination of the peripheral blood was made and no malarial parasites were noted. The symptoms appeared to the writer to resemble those of blackwater fever and Sternberg's treatment for that condition was adopted, with most satisfactory results. The beta-naphthol treatment was resumed a fortnight later without any ill effects.

R. P. C.

KEITH (R. D.). Ankylostomiasis, Diagnosis and Treatment.—*Jl. Trop. Med. & Hyg.* 1916. June 1. Vol. 19. No. 11. pp. 130–131.

The writer of this article considers that native labourers who harbour ankylostome worms, without manifesting any symptom of ankylostomiasis, are a danger to the labour force amongst which they work. They are a constant source of infection, all the more dangerous if unsuspected, and the author is of opinion that the presence of these "carriers" may explain the difficulty which is experienced in preventing the spread of the disease on estates and in mines.

Dr. Keith recommends the "systematic examination of the stools of all coolies at regular intervals, and the administration of anthelmintics to all those in whom ova are found, combined with rigorous and systematic hygienic measures." With reference to treatment, he considers that "at an early stage in the disease any of the anthelmintics usually recommended will prove efficient," whilst in later cases, with grave anaemia, he recommends the use of oil of chenopodium in 30 minim doses. This latter drug he gives as an emulsion, every hour for three hours, on an empty stomach, and followed an hour after the last dose by an aperient.

The author states that in Malaya, Java and Sumatra the treatment of ankylostomiasis with oil of chenopodium has met with great success.

R. P. C.

STEWART (F. H.). On the Life-History of *Ascaris lumbricoides*.—*Brit. Med. Jl.* 1916. July 1. pp. 5–7. With 4 figs.

This is a preliminary note relating to work on the life-history of *Ascaris lumbricoides*, which has been carried out by the author at Hong Kong. Although much of the work is incomplete, the results

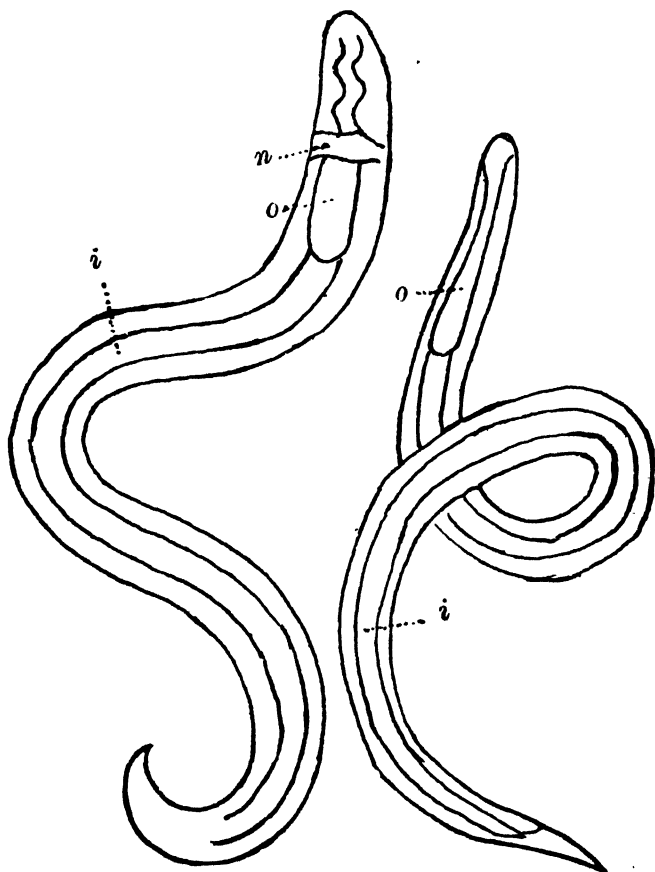
obtained are of considerable interest, since they point to the need for an alternation of hosts in the life-cycle of the parasite. The results are briefly summarised as follows :—

1. When ripe eggs [i.e. containing mature embryos, which have developed under suitable conditions of moisture and temperature in the outside world] are ingested by the rat (*Mus decumanus*) or mouse (*Mus musculus*), the embryos are liberated from their shells and invade the tissues of their host. Of the liberated embryos, only a few are passed in the faeces.

2. Four to six days after infection the larvae are found in the blood-vessels of the lungs, liver and spleen, and symptoms of pneumonia are produced in the host.

3. On the sixth day, the larvae pass "from the blood-vessels into the air-vesicles of the lung, causing haemorrhage into them."

4. On the tenth day, the larvae are only found in the air vesicles and bronchi.



*Fig. 1. Larva from lung of rat ($\times 385$) five days after infection. o, Oesophagus; n, nerve ring; i, intestine.

*Fig. 2. Larva from lung of rat ten days after infection ($\times 136$). o, Oesophagus; i, intestine.

"If the disease [i.e. pneumonia] does not prove fatal, the host recovers on the eleventh or twelfth day," and by the sixteenth day the host is free from parasites. The largest larva observed was in the lung of a rat, ten days after infection. It measured 1.32 mm. in length and the oesophagus of this specimen measured 0.22 mm.

A list of references to the literature on the subject is appended to the article.

R. P. C.

ROSS (Ronald). **The Life-History of *Ascaris lumbricoides*.**
[Correspondence.]-*Brit. Med. J.* 1916. July 8. pp. 60-61.

In commenting upon Captain STEWART'S paper [noted above] Sir Ronald Ross relates that whilst at Bangalore, India, he put out, in the sun, slides containing the ova of the human *Ascaris*. The slides were left for some weeks and became completely desiccated. When examined six weeks later, the eggs were found to contain fully-developed actively-moving embryos.

After being moistened, the slides were replaced in the sun and left for a further period of some weeks. When examined at the end of that period, the embryos were still confined in the eggs but had ceased to move.

The writer gathers from this observation that "the humidity which Captain STEWART refers to is not essential, at least for the human parasites and for their first development."

R. P. C.

MULLAN (K. P.). **Abdominal Abscess caused by *Ascaris lumbricoides*.**
[Correspondence.]-*Indian Med. Gaz.* 1916. Mar. Vol. 51. No. 3. p. 115.

This is a note on the case of an emaciated, ill-nourished girl, of twelve years of age, who was brought to the writer for the treatment of a sinus "in the right iliac fossa." The history given was that two months previously a painful red swelling, the size of a walnut, had arisen at the site at which the sinus was now seen. A week later the swelling had burst, and since that time, had continued to discharge a thin, serous fluid.

Upon examination, the sinus was found to be deep and to reach "almost to the peritoneum." The writer gave an anaesthetic and opened it up along its whole course. Three days after the operation a small *Ascaris lumbricoides* presented itself in the depth of the wound and was removed. Subsequently, santonin was given by the mouth and a further half dozen worms were passed *per rectum*.

R. P. C.

WACHENHEIM (F. L.) & BERNSTEIN (E. P.). **Two Cases of Infection with *Strongyloides stercoralis*.**-*Jl. Amer. Med. Assoc.* 1916. Apr. 8. Vol. 66. No. 15. p. 1092.

This paper gives the notes on two female children (sisters, aged six and nine years respectively) who were found to be suffering from *S. intestinalis* infection.

The children had always lived in New York, where this parasite is practically unknown.

The younger patient was found to have an eosinophilia of 11 per cent., and the elder, one of 17 per cent. The authors claim to have succeeded in ridding the patients of the parasites with thymol, and state that, after three weeks, the eosinophilia had fallen to 5 per cent. and 6 per cent. respectively.

R. P. C.

WHIDDON (R. C.). **Report of a Case of *Strongyloides intestinalis*.**—*Texas State Jl. Med.* 1916. Mar. Vol. 11. No. 11. p. 604.

Notes on the case of a male patient, aged sixty-six years, who had suffered from obstinate diarrhoea, associated with marked anaemia and emaciation, for a period of five years.

The patient stated that the malady had been contracted by drinking water from an old, disused well near which he was working, in the vicinity of Oklahoma City.

During the past five years he had had from five to seven motions daily, with acute exacerbations for a day or two, when ten to fifteen stools would be passed in the day. In the whole of this period he had not once passed a formed or solid stool.

He had been treated on several occasions for the malady, but without obtaining any relief. A specimen of the faeces was sent to Dr. L. W. KUSER who found large numbers of *S. intestinalis* present and this result was confirmed by Dr. W. H. MOURSUND, the Pathologist to the Baylor University Medical School. No other parasites were found, either then or at subsequent examinations.

The patient was treated by the administration of thymol [dose not stated] twice weekly for four weeks, and afterwards once weekly. Although the general condition of the patient improved and a gain in weight of twenty pounds is noted, the author states that "the stools still contained nearly as many parasites as when first examined."

R. P. C.

RODHAIN (J.) & Van den BRANDEN (F.). **Recherches diverses sur la *Filaria (Onchocerca) volvulus*.**—*Bull. Soc. Path. Exot.* 1916. Mar. Vol. 9. No. 3. pp. 186-198.

By the examination of a series of natives, infected with *F. volvulus* tumours, the authors have confirmed OUZILLEAU's observation as to the extreme rarity of the occurrence of *Mf. volvulus* in the peripheral blood. The research was carried out at Leopoldville [Belgian Congo], and the authors state that :—

1. Direct examination of the peripheral blood of 29 infected natives yielded constantly negative results.

2. The fractional centrifuging of 10 cc. of blood, from each of 15 infected natives, was also negative.

3. Six natives, similarly infected, whose blood (taken from the finger-tips) was examined daily, during a period of one month, gave a uniformly negative result.

With reference to the occurrence of microfilariae in the crural and inguinal glands, the authors were able to establish their presence by means of a single puncture in eleven cases out of twenty-eight.

An attempt made to demonstrate the presence of microfilariae in the serous fluid, obtained by blistering over a superficial *volvulus* nodule was unsuccessful.

A series of experiments was conducted with a view to determining whether carriers of *volvulus* cysts possessed, in their blood, specific antibodies capable of producing complement deviation.

Twenty-two cases were examined, and the authors conclude that patients, so infected, do not possess specific antibodies to any appreciable extent, the reaction of Bordet-Gengou being only produced in 13.6 per cent. of the cases examined. The antigen used in these experiments was an alcoholic extract of *Onchocerca volvulus*, taken from a cyst, and prepared according to the technique suggested by FORGES and MEIER. The presence of precipitins was not investigated.

An attempt was made to determine to what extent the eosinophile count was influenced by the injection of extracts of filariae into two monkeys. In the first case 1 cc. of an emulsion of a filaria (extracted from a cyst), in physiological salt solution, was injected into the peritoneal cavity. Two days afterwards, a drop of peritoneal fluid which was extracted showed in addition to mononuclears, a large number of eosinophile cells. No further examination was made for thirty-six days, when a further drop of peritoneal fluid revealed only a scanty number of mononuclears.

In the case of the second monkey, the sero-purulent contents of three *volvulus* cysts were injected beneath the skin of the flank. The blood was examined daily and it was noted that the eosinophile count steadily rose from 1.3 per cent. before injection, to 4.8 per cent. four days after injection. From this point the eosinophiles rapidly diminished and by the seventh day, after injection, had reached the normal level.

Experiments were also carried out with the object of testing whether mosquitoes [*Stegomyia fasciata*] and bugs [*Cimex rotundatus*] were able to function as intermediate hosts in the life-cycle of this worm. In both series the insects were fed upon a meal of blood which contained living microfilariae, obtained from a *volvulus* cyst. Four days later they were killed and examined. In no case of either series were developmental stages of the microfilariae found.

The writers call attention to the lack of uniformity which obtains in the *volvulus* tumours which they have excised. A description of the types and the gross characteristics observed are given.

R. P. C.

DUBOIS (A.). *Le rôle pathogène de Onchocerca volvulus*, Leuckart.—*Bull. Soc. Path. Exot.* 1916. May 10. Vol. 9. No. 5. pp. 305–309.

During a journey through the Welle District, Dubois has been able to confirm many of the observations on *Onchocerca volvulus* made by OUZILLEAU. He states that the parasite is extremely common in the Lower Welle district, especially in the vicinity of the important water ways. Other filaria parasites of man, known on the Welle, are:—*Acanthocheilonema perstans* and *F. loa*. The author states that

The children had always lived in New York, where this parasite is practically unknown.

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F. bancrofti is unknown there, and that chylous hydrocoele and haematochyluria are similarly unknown. The incidence of *O. volvulus* was found to be nearly equal in the two sexes, and always less frequent in children than in adults. A series of 1,449 infected cases were examined, in order to determine the relative frequency with which volvulus tumours occupied the various locations cited below. The following list summarises the results obtained :—

Sites occupied by volvulus tumours.	No. of cases.	Percentage.
1. Trochanter	448	30·0 approx.
2. Iliac crest	420	29·0 "
3. Sides of thorax	305	21·0 "
4. Mixed*	276	19·0 "

*Situating in two or three of the preceding sites, or elsewhere.

Occasionally the tumours may be found in the sacral, pubic or scapular regions and around the knee joint. The author however considers that, in order to determine the endemic index of a locality, examination of the three sites given in the above summary will yield a sufficiently accurate result for all practical purposes. In those cases in which *volvulus* tumours cannot be found either owing to their small size or concealed position, the infection may be determined by the presence of the *Mf. volvulus* in the fluid obtained by puncture from the more or less engorged inguino-crural glands. The writer states that "*Mf. volvulus* is regularly present in the lymph of the inguino-crural glands. Its presence is less frequently established in the cervical glands." He never succeeded in finding the microfilaria in the blood.

In the case of 53 patients suffering with elephantiasis, the writer records that 38 of these were carriers of *volvulus* tumours, 11 others were determined to be infected by puncture of the groin glands and in four only was the presence of *O. volvulus* not established. The writer considers, with OUZILLEAU, that "all cases of elephantiasis, in the Welle District, are infected with *O. volvulus*." Keratoderma is especially frequent amongst carriers of *volvulus* nodules, in heavily infected districts. It sometimes co-exists with elephantiasis and Dubois states that he has seen typical cases of it occurring in children. With reference to the geographical distribution of this parasite, the writer states that it is to be found throughout the whole of the Lower Welle District. Its incidence is, however, very variable in the various localities. Two series of adult natives—one of 500 individuals, the other of 150—which were examined, showed that, whilst in the former 17 per cent. were carriers of *volvulus* nodules, in the latter the carriers of nodules numbered 30 per cent. The heaviest infection was found on the Welle, between Bambili and Bondo. In that region, 50–60 per cent. of the adult population and 15–20 per cent. of the children were found to be carriers of the *volvulus* nodules. Cases of elephantiasis and keratoderma abounded there.

A table giving the results of the examination of the inhabitants of four districts near to Bambili, is included in this article.

R. P. C.

MARTINEZ ALVAREZ (A.). **Observaciones clinico-microscópicas sobre la filariasis.** [Clinical and Microscopical Observations in Filariasis.]—*Bol. Assoc. Med. de Puerto Rico.* 1916. Mar. Vol. 13. No. 110. pp. 17-21. With 2 charts.

The clinical observations recorded in the above paper are drawn from the study of fifty cases of filariasis, in the district of Puerta de Tierra. They may be briefly stated as follows :—

1. Puerta de Tierra is a heavily infected filarial district, and many of the forms of the disease met with there are, clinically, atypical.

2. Filariasis should be suspected in all cases of fever occurring there, regardless of age; the author found the infection present in patients with ages ranging from five to fifty years.

3. The absence of enlarged glands should never be taken as negative evidence of filariasis.

The results obtained by the author from his microscopical study of the blood, of the cases quoted above, were as follows :—

1. During an acute attack of filarial fever, a polymorphonuclear leucocytosis is observed. The total leucocyte count may, in consequence, rise to 30,000.

2. At the termination of an attack there is, in some cases, a periodical nocturnal eosinophilia.

3. The red blood count and the haemoglobin index both fall below the normal figure during the attack and remain low subsequently.

R. P. C.

BOCKHORN (M.). **Ueber bisher unbekannte Filariablutfunde bei gefangenen Russen.** [A Hitherto Unknown Filaria found in the Blood of Russian Prisoners.]—*Med. Klinik.* 1915. Sept. 12. Vol. 11. No. 37. pp. 1029-1031. With 3 figs.

In one of the prison camps in Germany, the writer found a small microfilaria in the blood of each of three Russian prisoners. The microfilaria was similar to, but smaller than *Microfilaria perstans*. The three prisoners were all suffering with fever, bronchitis and oedema of the legs and feet in addition to other maladies.

In his search through the literature on this subject the author has found that a not greatly dissimilar microfilaria has been described by REICHMANN. This latter observer obtained his specimen from a pleural exudate, but was unable to find microfilariae in the blood of the patient from whom the exudate came.

Bockhorn's cases originally came from Samara, Siberia and Astrachan.

R. P. C.

RODENWALDT (E.). **Bemerkung zu dem Artikel von Dr. M. Bockhorn "Ueber bisher unbekannte Filariabefunde bei gefangenen Russen".** [Observation on Dr. Bockhorn's Article "Concerning a Hitherto Unknown Filaria found in Russian Prisoners".]—*Med. Klinik.* 1915. Oct. 30. Vol. 11. No. 44. p. 1212.

In his comments on BOCKHORN's paper, the author calls attention to the fact that the geographical distribution of *Microfilaria perstans* in European and Asiatic Russia is unknown; and that the microfilariae illustrated in his article show a greater variation in size than

would be observed were they in reality the embryos of *F. perstans*. Rodenwaldt mentions the case of his own child in whose blood he found similar forms to those shown in the illustrations to Bockhorn's article. He apparently leans to the opinion that these "microfilariae" are artefacts—either shreds of filter-paper or fungi—collected during the process of preparing and staining the films.

R. P. C.

PHIPPS (Cadis). *Filaria sanguinis hominis*. With report of a Case.—*Jl. Amer. Med. Assoc.* 1916. Jan. 22. Vol. 66. No. 4. pp. 266–267. With 2 figs.

This article gives a short, and incomplete, account of the development of *Filaria bancrofti*; together with the report of a case of this infection, which had been under the author's care.

The case was treated by the intravenous injection of 0.4 gm. of salvarsan. No microfilariae were found in the peripheral blood of the patient during the night following the injection. Apart from this fact no further history is recorded.

R. P. C.

DUTCHER (B. H.) & WHITMARSH (P. L.). The Results of Blood Cultures from Thirty-Six Individuals, with their Possible Bearing on the Etiology of the So-called Filarial Diseases; and Description of a New Parasitic Bacillus, believed to be the Causative Agent of Filariasis.—*Amer. Jl. Trop. Dis. & Prevent. Med.* 1915. Aug. Vol. 3. No. 2. pp. 69–74.

Whilst investigating the actual relationship which exists between *Filaria nocturna* and the so-called filarial diseases the authors undertook a series of blood examinations, which resulted in their finding a certain bacterial organism in thirty-six cases of the series.

Fifteen hundred persons were examined and about three thousand examinations were made. Of the thirty-six cases in which the organism was found two were "check" cases and these the authors regard as "carriers."

The bacillus resembles in morphology and size *B. subtilis*, but the authors do not believe it to be identical with that organism.

It is described as being motile, aerobic, non-acid fast and spore-bearing. In broth it forms a thin, white, parchment-like pellicle, which it is difficult to submerge and wet. It grows more readily on plain agar than on glycerine agar, and more rapidly at 37° C. than at room temperature. On plain agar it forms a white growth which becomes yellowish in old cultures. In gelatine stab-cultures flocculi appear, which later liquefy the medium and coalesce. Coagulated hydrocele fluid is slowly liquefied. A tube of spores was rendered sterile by boiling for less than five minutes.

For this organism the authors suggest the name of *Bacillus lymphangiticus*, as they believe it to be "the cause of those diseases grouped under the designation of 'filariasis.'"

R. P. C.

WARD (Henry B.). *Gongylonema in the Rôle of a Human Parasite.*—*Jl. Parasit.* 1916. Mar. Vol. 2. No. 3. pp. 119-125. With 1 plate.

The parasite described in this paper was extracted from beneath the mucosa of the lower lip of a girl, aged sixteen years, by Dr. R. L. COVINGTON of Jefferson, Ark. The patient stated that she had actually seen the worm on three occasions and that it moved up and down in the tissues, extending its migrations from the lips to the fauces. She had lived in Arkansas all her life and had never been out of the United States.

Dr. COVINGTON describes the worm as being "just beneath the mucosa" and "about three-quarters of an inch in length and about the size of a No. 60 sewing thread." It was extracted by means of a needle.

The examination of the parasite was carried out by Dr. Ward and the following summarises his description. The worm measures 42.1 mm. in total length and is of nearly equal diameter throughout, tapering only a little at each extremity. The anterior extremity, for 1.4 mm. of its length, is ornamented with cuticular tubercles which are definitely arranged. A cuticular ridge runs along the lateral line, starting at a point 0.25 mm. from the anterior end and extending backwards for about 1.5 mm. A group of papillae or lips surround the mouth, and from this latter extends the "capilliform" oesophagus. The oesophagus disappears from view behind the anterior tip of the cuticular ridge. The excretory pore is situate in the mid-ventral line and is 0.6 mm. from the anterior tip of the body. This is surrounded by a peculiar papilla. The vulva is located 2.15 mm. from the posterior extremity of the body and is slightly prominent with raised lips. The anus is within 0.25 mm. of the same extremity.

Dr. Ward considers that "there can be no doubt that this specimen belongs to the genus *Gongylonema* in the family of the Filariidae," and that it is not improbable that infection may have been transmitted by the accidental ingestion of the croton bug or some other insect functioning as intermediate host for this worm.

The author is inclined to determine this specimen, from man, as *G. pulchrum*—an occasional parasite of the pig in both Europe and North America.

R. P. C.

ZIEMANN (H.). *Phenokoll bei Filariaerkrankungen.* [Phenokoll in the Treatment of Filariasis.]—*Arch. f. Schiffs- u. Trop.-Hyg.* 1915. July. Vol. 19. No. 14. p. 377.

Professor Ziemann, in the above note, states his opinion that there is no proof that this drug is of the slightest service in filarial diseases. He bases this opinion upon six cases of *F. loa* infection which he treated by the administration of Phenokoll hydrochloride.

R. P. C.

- ROBERTSON (J. A.). i. **Pepper as a Prophylactic against Filariasis** [Correspondence].—*Lancet*. 1915. Sept. 18. p. 673.
ii. **Pepper in the Prophylaxis and Treatment of Filariasis.**—*Brit. Med. Jl.* 1915. Oct. 9. p. 535.

The writer of the above notes calls attention to observations he has made [in British Guiana] regarding the use of pepper as a prophylactic agent in filariasis.

In support of his observation, he cites the cases of the aboriginal Carib Indians and East Indians—both “creole” and immigrant—who take large quantities of pepper in their food, and amongst whom filariasis is almost unknown. On the other hand, the Portuguese, Negroes and other inhabitants, who take little pepper in their food, are those in whom filariasis is most commonly seen.

Assuming that pepper was of prophylactic value in this disease, he experimented with *Tinct. capsici* in the treatment of cases of lymphangitis and acute filarial fever. He found that both conditions yielded promptly to the drug.

He suggests that Piperine, if used in the treatment of these cases, would yield equally satisfactory results.

R. P. C.

- DAVIS (George G.) & HILTON (J. J.). **Guinea Worm Disease.**—*Jl. Amer. Med. Assoc.* 1915. Oct. 2. Vol. 65. No. 14. pp. 1175–1176. With 2 text-figs.

The above article embodies a short account of guinea-worm disease and notes on a case of that infection occurring in a member of the British Expeditionary Force, in France.

The case was that of a non-commissioned officer of the Cameron Highlanders who had spent five years, of his seven-and-a-half years' service, in India.

Whilst he was on duty, one worm measuring two feet in length was removed from the flexor aspect of the left forearm. The removal was effected by means of a lead pencil around which the worm was gradually wrapped.

At the same time he noticed slight flesh wounds below the internal malleolus of the left foot and on the dorsum of the right. These wounds the patient attributed to injuries from barbed wire obtained whilst bathing behind the trenches. Subsequently both wounds became septic and he was admitted to hospital for treatment. Under anaesthesia one entire worm and several parts of one or more other worms were removed from the left foot, and from the right foot parts of still further worms were extracted.

The writers state that the complete worm measured 32 cm. in length and 3 mm. in circumference.

R. P. C.

- BARLOW (Nathan). **Intestinal Parasites in Spanish Honduras.**—*New Orleans Med. & Surg. Jl.* 1915. Oct. Vol. 68. No. 4. pp. 271–274.

Dr. Barlow gives, in this paper, the results of a thousand examinations of faeces obtained from natives of Honduras, Nicaragua, Salvador and Guatemala. Originally it was the writer's intention to give the

figures for the natives of these several countries separately, but finding no appreciable difference in the percentages they are combined in the subjoined lists.

At least six cover-glass preparations were examined in each case. In the first hundred cases all those in which hookworm infection was not found were re-examined by Bass's centrifugal method and received thymol. As in only one case was a positive result obtained after this re-examination, Barlow assumes his figures to be accurate within 1 per cent. The degree of incidence was as follows :—

	Natives (800 cases).	Negroes (100 cases).	Whites (100 cases).
Free from parasites ..	5.5 %	3.0 %	27.0 %
One species only ..	38.5 %	47.0 %	29.0 %
Two or more species ..	56.0 %	50.0 %	44.0 %

The percentage infection with the various parasites is given in the following list :—

	Hook- worm.	<i>Trichuris</i> <i>trichiura</i> .	<i>Ascaris</i> <i>lumbri-</i> <i>coides</i> .	<i>Strongylo-</i> <i>ides intesti-</i> <i>nalis</i> .	<i>Taenia</i> <i>saginata</i> .
Natives (800 cases)	79.25%	49.0%	44.5%	2.5%	0.87%
Negroes (100 cases)	54.00%	47.0%	40.0%	10.0%	4.00%
Whites (100 cases)	20.00%	38.0%	13.0%	3.0%	3.00%

The hookworm infections were due to *Necator americanus* with two exceptions. One of these was a West Indian negro in whom *Ankylostoma duodenale* was found and the other [race not specified] was infected with both *Necator* and *Ankylostoma*. In regard to *Oxyuris vermicularis*, only a few children were examined and its prevalence cannot be definitely stated. Dr. Barlow is of opinion that this parasite is less common in Honduras than "in civilised countries."

In addition to the above parasites one case of *Echinorhynchus* (?) is noted and reference is made to a taeniform parasite occurring in two other patients. With regard to this latter, it is described as being segmented, possessing a head resembling the scolex of *Dibothriocephalus*, but furnished with a single sucker leading into an alimentary canal. Operculated ova were found in both cases.

R. P. C.

FREY (J. H.). Helminthiasis at Texas State Orphans' Home.—*Texas State Jl. Med.* 1915. Aug. Vol. 11. No. 4. pp. 229-231.

The Texas State Orphans' Home had, at the time when Frey compiled the following figures, 270 children in its care; and of these 118 (47.7 per cent.) were infected with intestinal parasites.

The sexes were approximately equally represented on the roll, but of those infected 53·3 per cent. were males. Double infections were noted in eleven of the cases.

The species represented and the percentages obtained are as follows:—

<i>Uncinaria</i>	57·6 %
<i>Hymenolepis nana</i>	32·6 %
<i>Oxyuris vermicularis</i>	6·2 %
<i>Trichocephalus trich.</i>	2·3 %
<i>Taenia saginata</i>	0·7 %

The large percentage of children infected with *Hymenolepis nana* is worthy of note and the author refers to STILES's prophecy of twelve years ago that "*Hymenolepis nana* will be found to be the commonest tape worm in the United States." With regard to the connection which exists between eosinophilia and the presence of intestinal parasites the author gives the following figures:—

Degree of Eosinophilia.	Percentage of cases found to be infected with Helminths.
0·0 % - 2·0 %	None.
2·0 % - 5·0 %	23·1 %
5·0 % - 10·0 %	81·3 %
10·0 % and above	100·0 %

R. P. C.

CHESTER (R. W.). Intestinal Parasites in the Central Jail, Rajahmundry.
—*Indian Med. Gaz.* 1916. Mar. Vol. 51. No. 3. pp. 96-98.

During the period October, 1914-August, 1915, the stools of 2,296 convicts in the Central Jail, at Rajahmundry, were microscopically examined; and, of that number, 71·30 per cent. were found to be infected with one or more species of intestinal parasites.

Of the parasites detected, 6·92 per cent. were protozoa. The remainder were helminths and occurred in the following percentages:—

<i>Ankylostoma duodenale</i>	46·43 %
<i>Ascaris lumbricoides</i>	24·60 %
<i>Oxyuris vermicularis</i>	15·71 %
<i>Trichocephalus trichiuris</i>	2·67 %
<i>Taenia</i> [species not stated] ..	2·29 %
<i>Strongyloides stercoralis</i>	1·38 %

Dr. Chester states that no district in the Madras Presidency, from which prisoners are sent to the Rajahmundry Jail, is exempt from infection with some kind of intestinal parasite; and no caste appears to be free. With regard to occupation he notes that infection with ankylostomes was chiefly found amongst coolies and cultivators.

The author concludes his paper by remarking that "if intestinal parasites do not always cause a high death-rate, they are certainly responsible for a large amount of sickness and loss of wage-earning capacity among those classes that can ill-afford to be out of work."

He considers that there is need for active preventive measures in South India, "where ankylostomiasis tends to become widespread owing to the habit of depositing dejecta in fields and open places."

R. P. C.

FAUNTLEROY (C. M.) & HAYDEN (R.). A New Method of examining Stools for Eggs.—*U.S. Nav. Med. Bull.* 1915. Jan. Vol. 9. No. 1. pp. 81-82.

The following method of preparing specimens of faeces for the examination for eggs is based on the fact that when the faeces are mixed with aniline gentian violet, the faecal matter takes up the stain whilst the eggs do not. This is in consequence of the inability of the stain to penetrate the egg-membrane. [Since alcoholic stains do not penetrate the egg-membrane, they are useless for this purpose.]

The authors have used this method in the examination of over a thousand stools with uniform success. The technique which they advise is as follows :—

1. About two grams of faecal material is thoroughly mixed with five cubic centimetres of a two per cent. aqueous solution of lysol in a centrifuge tube ; and centrifuged, at high speed, for one minute.

2. The supernatant fluid is decanted and fresh lysol solution is added to, and thoroughly mixed with the sediment. This is again centrifuged, and the process is repeated three times.

3. Upon completion of the centrifuging, a small portion of the sediment is transferred to a clean slide, by means of a clean pipette, and a drop of aniline gentian violet is added and mixed with the sediment. A coverslip is then placed upon it and the specimen is ready for examination.

The authors state that the lysol solution, mentioned in the technique, is not an essential ; but is used merely for disinfectant purposes.

R. P. C.

STILES (C. W.). Intestinal Infections. The School Grades attained by 2,166 White School Children (1,062 Boys, 1,104 Girls) in the City of X. Classified by Age, Sanitation and Intestinal Parasites.—*U.S. Public Health Rep.* 1915. July 9. Vol. 30. No. 28. pp. 2060-2067.

This article is a further contribution to a series, which Professor Stiles has written, regarding the connection which exists between home-sanitation and the progress made by children at the State schools.

He has noted that a definite relationship is found between defective sanitation and coprophagia, and explains the larger proportion of intestinal parasites found in children coming from homes with defective sanitation by this fact.

Regarding the influence which is exercised by these parasites on the progress made by the children at the schools, he is of opinion that

Entamoeba coli and *Lamblia* do not affect the position occupied by the scholars in the school grades; whilst *Ascaris lumbricoides* and *Necator americanus* he regards as factors which must be considered as of practical importance, in connection with retardation of progress, "even in cases of relatively light infection." The data for infection with *Trichomonas*, *Oxyuris*, *Trichuris* and *Hymenolepis nana* were insufficient to warrant any deductions being drawn in regard to these parasites.

R. P. C.

SEIDELL (Atherton). **The Excretion of Thymol in the Urine.**—*U.S. Public Health Service. Hygienic Laboratory Bull.* No. 101. 1915. Aug. pp. 43-51.

As a result of work carried out in collaboration with W. H. SCHULTZ, the author has previously reported that only insignificant amounts of ingested thymol are excreted in the faeces.

In this article the fate of the remaining portion is dealt with, and from experimental work on dogs most interesting results have been obtained.

The author deduced, from the small amount of the drug recovered in the faeces, that thymol is almost completely absorbed from the alimentary canal and must therefore be oxidised in the tissues or excreted in the urine. BLUM's recovery of thymol glycuronate from the urine had conclusively demonstrated that excretion in the urine does take place to some extent, and the author has devised a method of recovering and estimating the amount which is got rid of by this channel.

The method of recovering the drug consisted in the steam distillation from strongly acid solution and subsequent redistillation of the nearly neutral distillate. The second distillate was titrated by the bromine-hydrobromic acid method [Seidell].

The application of this method to samples of urine from dogs, which has been previously dosed with thymol, showed that 41-46 per cent. was recovered when doses of 0.3-0.7 gram were given and 31-36 per cent. when larger doses of 1.2-1.8 grams had been ingested.

The author states that the simultaneous administration of olive oil caused slight, if any, effect upon the percentage of excreted thymol. "It is a question, therefore, whether oils really increase the amount of absorption of thymol or only the rate."

The urines obtained from two boys (of nine and thirteen years of age respectively), who were receiving thymol treatment for hookworms, gave results which agreed pretty accurately with those obtained from the experiments on dogs. Each boy received 0.9 gram thymol and the amount recovered from the urine [collected for twenty-three hours after the administration of the drug] was in one case 35 per cent. and in the other 33 per cent.

Referring to the amount of thymol that is not excreted in the urine and faeces (a half to two-thirds), the author considers it probable that

thymol is present in the blood stream passing through the lungs and that a certain amount would, doubtless, be lost by volatilization. In this connection, he cites CUSHNY's observations regarding the occurrence of "marked congestion and even consolidation of the lungs" in fatal thymol poisoning, and LANGERHAN's records of autopsies, made on cases which had terminated fatally after the absorption of phenol from the intestinal tract, in which marked bronchitis and laryngitis were noted.

R. P. C.

WEINBERG (M.) & SÉGUIN (P.). **Recherches biologiques sur l'Eosinophile. Deuxième partie. Propriétés phagocytaires et absorption de produits vermineux.**—*Ann. Inst. Pasteur*. 1915. July. Vol. 29. No. 7. pp. 323-346. With 2 plates.

In this article the authors give the results of a series of experiments, made with a view to determining the limitations of the phagocytic properties possessed by the eosinophile leucocytes.

The experiments were made both *in vitro* and *in vivo*; and, in the latter case, guinea-pigs were used throughout. In both cases, it was found that the eosinophiles are capable of engulfing not only a large number of species of bacteria, but also protozoa and the red blood cells. It is noted, however, that more intense phagocytosis was observed in the presence of bacteria than in the presence of the cellular organisms.

The authors state that "the experiments carried out with *B. subtilis* and *B. coli*, the protozoa and the red blood cells, enable them to affirm that the eosinophiles are capable of digesting, as well as engulfing, these elements."

The eosinophiles display their phagocytic properties equally well *in vitro* and *in vivo* (peritoneum, subcutaneous cellular tissue and the circulating blood).

A further series of experiments was carried out, with the object of ascertaining the part played by the eosinophiles in the presence of helminthic products. From these it was found that after the eosinophile cells had been in contact with hydatid fluid at 37° C. for one hour, their phagocytic properties were lost. Similar exposure, in the case of the polymorphonuclear and mononuclear leucocytes, left their phagocytic powers unaffected.

The hydatid fluid was also found to have suffered in the loss of its antigenic power—the antigen having been fixed by the eosinophile cells. The eosinophiles of animals previously immunised against hydatid fluid fixed the antigen with greater facility than did the eosinophiles from animals not so treated. It was also established that this fixation of the hydatid antigen takes place both at low and at moderately high temperatures.

The authors consider that, having absorbed the toxic products from the hydatid fluid, the eosinophiles play an important role in the elaboration of the specific antibody.

R. P. C.

PENSCHKE. **Behandlung von Wurmkranken mit Filmaronöl.** [The Treatment of Worm Infections with Filmaronöl.] — *Arch. f. Schiffs- u. Trop.-Hyg.* 1915. Mar. Vol. 19. No. 5. p. 149.

The results obtained from the treatment of two series of cases with Filmaronöl are recorded in the above note.

In the first series, treated at Tanga [German East Africa], there were forty cases. Thirty-three of these received 10 gm. each, two had 15 gm. each and five 20 gm. each. The examination of the faeces, subsequent to treatment, showed that 91.9 per cent. of the cases still continued to pass worm ova.

In the second series, treated at Lindi [German East Africa], there were thirty-one cases, and to each was given 10 gm. of the drug. The subsequent examination of the faeces showed that 60 per cent. of the cases retained their infections. One case, in this latter series, died from exhaustion, four days after the administration of the drug.

R. P. C.

MISCELLANEOUS.

GOLD COAST. Report of the Accra Laboratory for the Year 1914. [J. W. Scott MACFIE.]—56 pp. With 2 plates and a map. 1916. London: J. & A. Churchill. [Price 5s. net.]

With the exception of five pages this report is occupied by an account of "routine examinations and special investigations." It is noted that research work was only undertaken in the last four months of the year so that most of the investigations are incomplete.

Blood examinations.—Of the malarial parasites detected in Europeans and natives malignant tertian formed about 90 per cent. The author notes the rarity with which crescents were encountered in these infections. He does not suggest any explanation beyond referring to STATHAM'S view [this *Bulletin*, Vol. 4, p. 484]. In a European patient malarial parasites were found which simulated the type described by STEPHENS under the name *P. tenue* [*loc. cit.* Vol. 3, p. 432]. Macfie thinks that the parasites were the same as those figured by BALFOUR and WENYON in a more recent paper [*loc. cit.* Vol. 5, p. 53]. He suggests they were merely unusual forms of *P. falciparum*. They illustrate the occurrence of great amoeboid activity in these infections. In another case malarial parasites were found with no detectable nuclear matter. The majority were typical specimens of *P. falciparum*, but the rest had no material that assumed the chromatin tint when stained by Leishman's method. The author has not been able to find any record of the occurrence of such parasites. In a case of fatal blackwater fever the cytoplasm of the parasites remained almost unstained; the parasites were in consequence extremely difficult to detect. It is suggested that this might account for some of the cases of blackwater fever in which malarial parasites have not been discovered. The infection was believed to be one of *P. falciparum*. An account is given of a fatal and exceptionally intense infection with malaria [this *Bulletin*, Vol. 5, p. 243]. The Arneth counts made by the writer have been already reported on [*loc. cit.* Vol. 6, p. 345].

The section headed "A Few Blood Puzzles" contains an account of forms of neutrophile leucocytes which were obtained by puncture of an indurated mass in the groin of a European; the nucleus instead of being composed of lobes connected by fine filaments was broken up into a number of separate fragments. Similar cells have been figured by BALFOUR, ROWLEY and O'BRIEN. All explain them as degenerated forms of the polymorphonuclear neutrophile leucocytes.

Under the heading "Examination of Sputum" is an account of two cases of bronchial spirochaetosis [this *Bulletin*, Vol. 6, p. 211]. Details of some post mortem examinations of special interest are given. For an account of the examination of blood films obtained from the Accra Slaughter-house see this *Bulletin*, Vol. 7, p. 91. Of the trypanosomes found in cattle *T. vivax* was in the majority, *T. congolense* coming next and *T. pecaudi* last. Of 95 sheep examined *T. vivax* was found in three and *T. congolense* in two, and in 94 pigs *T. congolense* was found in five. In 80 goats examined neither trypanosomes, piroplasms nor filaria embryos were found; the author draws attention to the fact that goats have been credited with being a natural reservoir for *T. vivax*. The trypanosome infections of these animals

are discussed in some detail with charts showing the distribution according to length and breadth of *T. congolense* (*nanum*). Of 33 equines examined 20 were found infected with trypanosomes, the majority with *T. pecaudi*. It is noted that *T. pecaudi* is almost invariably fatal in horses, *T. vivax* never so and that *T. congolense* has an intermediate virulence; however *T. vivax* incapacitates its victims for a long time.

Examinations of Mosquito Larvae.—A table shows the results of examinations of domestic mosquitoes in Accra for the last part of 1912 and the whole of 1913 and 1914.

"From an examination of this table it is evident that *Stegomyia* (78·34 per cent.) is by far the most common genus of domestic mosquito in Accra, and that *Anopheles* (1·81 per cent.) is rarely found, at any rate in the native compounds. All the *Stegomyia* mosquitoes appear to have been *S. fasciata*; those of the genus *Culex* were in order of greatest frequency of occurrence: *C. fatigans*, *C. decens*, and *C. tigripes*; whilst the only species of *Anopheles* recorded was *A. costalis*."

It is noted as somewhat remarkable that of the 32 species of mosquito recorded as occurring at Accra only five should have been represented in the collections of larvae sent to the laboratory for identification. A chart is given showing the distribution of *Stegomyia*, *Culex* and *Anopheles* in the blocks into which Accra is divided for the purposes of sanitary organisation. The different genera are shown by coloured discs. *Stegomyia* and *Culex* were found in nearly every block and *Anopheles* in several, in many instances in the heart of the town in pots and other domestic utensils. An account is given of an experiment bearing on the biology of *Stegomyia fasciata*, in which the mosquitoes had the opportunity of feeding both by day and by night [cf this *Bulletin*, Vol. 5, p. 309]. Naphthalene was tried suspended above the surface of water for the destruction of mosquitoes. It was found to have little practical value.

A summary is given of the examinations made in the laboratory, and a large coloured plate of blood parasites of man and animals.

A. G. B.

NIGERIA. Annual Report, 1914, Medical Research Institute. [A. CONNALL & H. Sinclair COGHILL.]—22 pp. 1916. London: Published by the Crown Agents for the Colonies. [Price 2s. 6d. net].

Yellow fever investigations were carried on throughout the year. The results have already been reported in full to the Yellow Fever (West Africa) Commission [this *Bulletin*, Vol. 7, p. 288 *et seq.*]. A synopsis is given.

Malaria.—The subtertian parasite was successfully cultivated on four occasions. Three of the patients were natives (two lepers) and one a European. An account of the symptoms, appearance of the parasites, and results is given. The authors write:—

"Ordinary room temperature in this part of the tropics is apparently quite suitable for the growth of the parasite by Bass's method of cultivation, when the tubes are kept in the dark. The occurrence of phagocytic phenomena in the culture from all three natives, and the absence of these phenomena in the cultures from the European support the contention that the adult native has some degree of immunity to malarial infection. This partial immunity enables him at times to recover from the infection without the use of quinine. All three natives have been under observation

for over six months since their attack, and no relapse or reinfection has followed. The statement by J. G. and D. Thomson in the paper above alluded to, that the pigment in subtertian parasites (*Plasmodium falciparum*) collects into a definite mass at an early stage of growth, is confirmed by the results obtained at the Institute.

"The appearance of crescents in the culture tubes has apparently not been previously described, and but slight reference has been made in the literature to the marked phagocytic phenomena which were noted in the present cases."

Three young monkeys were found to harbour malarial parasites. A note of these cases has been published [this *Bulletin*, Vol. 4, p. 95]. Two Bass cultures were made from a monkey at intervals of six months; the results are given. Transmission experiments were made with five species of mosquito with negative results and no developmental forms were found in mosquitoes on dissection.

Blackwater fever.—Dr. NEALE reported an unusual complication in three consecutive cases, an ulcerated condition of the fauces. The ulceration was deep, and tended to spread rapidly.

Trypanosomiasis.—Blood smears from 126 pigs were examined and *T. pecorum* was found in 12. Of blood films from 22 dogs seven contained a trypanosome of the *brucei* type. The remains of a large herd of cattle brought to Lagos from the Northern Provinces were examined. Deaths at the time were very numerous. *T. vivax* was present in 44 out of 54 animals and 15 harboured *Babesia* in addition. An account is given of treatment by atoxyl and salvarsan. It was unsuccessful.

Ankylostomiasis.—The authors think it "possible that ankylostomiasis in the sense of a grave and often fatal illness exists in West Africa to a greater extent than is generally known. . . . It is certain that a very large percentage of the natives harbour ankylostomes and also that Europeans not infrequently become infected."

Typhoid fever.—Nine Widal reactions were done; only one gave a positive reaction. Post mortem specimens were received from a fatal case in a native at Kaduna.

Tumours.—Tumours or portions thereof were sent from 14 cases in natives; 11 were sarcomata and three were scirrhus cancers.

Entomology.—Dr. DALZIEL sent regular collections of mosquitoes from Lagos and its neighbourhood. The species received for each month are detailed. He also sent samples of larvae found by the sanitary inspectors during their rounds. Larvae of ten species were obtained. These were in order of frequency:—*Stegomyia fasciata*, *Culicomyia nebulosa*, *Anopheles costalis*, *Ochlerotatus irritans*, *Culex decens*, *C. tigripes*, *C. duttoni*, *C. insignis* and *C. grahamei*.

Cyclops were also found. *Stegomyia* larvae, when they occurred with other species, were most commonly associated with *Culicomyia nebulosa* and, in order of frequency, with Psychodids, *Anopheles costalis* (in wells) and *Ochlerotatus irritans* (in crab holes). The report closes with a table of the mosquito larvae.

A. G. B.

BOMBAY. Report of the Bombay Bacteriological Laboratory for the Year 1914. [Major W. Glen LISTON, Director, Bombay Bacteriological Laboratory.]—14 pp. 1916. Bombay: Printed at the Government Central Press. [Price 4a. or 5d.]

This report is divided into Part I, which deals with work connected with plague and Part II, concerned with the work of the laboratory as the Provincial Bacteriological Laboratory.

Part I.—The number of doses of anti-plague vaccine sent out was 812,942, a greater amount than in any previous year except 1911; the largest demand was from the United Provinces. Some carefully compiled statistics of the results of inoculation in the Dharwar District, Bombay Presidency, are given. These figures are discussed. They concerned 311 inoculated and 344 uninoculated persons. After necessary corrections to make the two groups as far as possible comparable, it is concluded that the uninoculated were attacked three times more frequently than the inoculated and that the latter had nearly ten times fewer deaths. "These figures show that the vaccine as at present issued from the laboratory maintains a high degree of efficiency."

Experiments were made on rats to determine whether two small doses of vaccine were as efficient in producing immunity as a single large dose, the large dose in the case of man causing a severe reaction. The double dose having been found more efficient in rats than the single, it was tried on man. It is recommended to give 1 to 2 cc. followed a week later by 2 to 4 cc. The severity of the reaction is lessened and a high degree of immunity is obtained.

The fleas of rats caught in Bombay, Coonoor and Ootacamund were carefully examined to determine the frequency of *Xenopsylla astia*, first reported from Ceylon [see this *Bulletin*, Vol. 3, p. 205]. For Bombay there were 18.5 per cent. *astia* as against 80.6 per cent. *cheopis*; in the other places *astia* formed 0.5 per cent. and *nil* against 87.5 and 91.9 per cent. *cheopis*. Of 210,080 dead rats examined 12,530 were found plague-infected.

Part II.—After an account of the routine work the author passes to research work on guinea-worm disease. Of 159 persons in a certain village 51, who had long been resident there, never suffered from the disease while 70 had suffered. The sole water supply is a small well. No explanation is offered. Of the persons attacked some suffered almost every year, others once, twice or thrice. It is shown that by a moderate outlay this cause of disability could be eliminated, with a net gain in cash when the loss of wages is considered.

Some studies on the tubercle bacillus were made by Dr. SOPARKAR. Captain TAYLOR, I.M.S., has reported on the water supply of Aden.

A. G. B.

FEDERATED MALAY STATES. 14th Annual Report of the Institute for Medical Research, Kuala Lumpur, 1914. [Henry FRASER.]—73 pp. 1915. Kuala Lumpur: Printed at the Federated Malay States Government Printing Office.

Beriberi.—Recent criticisms of the rice theory of beriberi are discussed under the following headings:—Beriberi as a place disease;

Beriberi as a disease caused by a micro-organism and directly communicable from person to person; Beriberi as a disease of protozoal or other origin transmitted by an intermediate host such as bugs, lice or fleas, etc. The author asks opponents to remember that "their observations do not necessarily invalidate the conclusions arrived at in regard to the origin of the disease elsewhere. Facts rather than surmises are now necessary if they would combat effectively a theory whose application in practice has been attended by widespread and beneficial results among the rice-eating peoples of the Orient."

Leprosy.—This section [pp. 6-51] has been already summarised in this *Bulletin* [Vol. 7, p. 185]. The subject is considered under the headings: Fish and leprosy, Leprosy and animals, Leprosy and Kedrowsky's bacillus, Karlinski's bacillus, the Wassermann and Luetin Reactions in Leprosy. No culture of a leprosy bacillus was obtained on fish media inoculated from nodules. The author did not succeed in transmitting leprosy to any of 70 animals. He did not succeed in growing the leprosy organism.

Bacillary dysentery.—An enquiry was undertaken as to the characters of the bacilli commonly associated with dysentery in the F.M.S. Stools from dysentery cases in which amoebae could not be found were used. They were streaked on Drigalsky-Conradi medium. Non-lactose fermenting colonies were transferred to + 10 agar medium and on the second day after isolation were tested for their fermentation reactions in the various sugar media. They were also tested by the agglutination reaction with immune sera prepared from the Shiga-Kruse and Y strain of Hiss and Russell. One hundred and twenty-nine cases were dealt with, and 53 strains of dysentery-like organisms were isolated from 49 cases. The strains are tabulated, with the sugar reactions. The organisms fall naturally into two groups—those that ferment dextrose, laevulose and galactose only and those that ferment mannite as well. Organisms of Group I, the *B. dysenteriae* of Shiga-Kruse, were agglutinated only by the specific immune serum; organisms of Group II, *B. pseudodysenteriae*, were agglutinated by an immune serum prepared from strains of the Y bacillus.

Cholera. Experiments were carried out to test the viability of freshly isolated cholera vibrios in water from various sources. "A series of observations showed that such cholera vibrios inoculated into water drawn from the river at Alor Star could be recovered from it as long as 80 days thereafter and that they were unchanged in their essential characters. Similar numbers of cholera vibrios inoculated into similar quantities of Kuala Lumpur tap water were dead in less than 24 hours in nearly every case." The precise explanation was not obtained.

Luetin reaction in syphilis.—This section is furnished by Dr. FLETCHER. The reaction was tested on a group of 130 syphilitics. It was positive in 79 cases and negative in 51. The proportion of positive results was least in primary syphilis, greater in secondary and greatest in the tertiary stage. Of these cases 109 were tested by the Wassermann reaction. "There was no more agreement in the results of the two reactions than is accounted for by chance; in the series of 109 cases the results were the same in 56 and at variance in 53. This shows that the substance which gives rise to a positive Wassermann reaction is not the same as the substance which causes a positive response to

an injection of luetin." In ten of the syphilitic cases both reactions were negative. The author describes two of these cases and concludes that among the negative cases there were at least one case of active secondary syphilis and one case of active tertiary syphilis. Both these reactions were tested on a second group consisting of 82 persons suffering from beriberi, malaria and leprosy respectively. Several of these reacted to the Wassermann test, but none to the luetin test. The conclusion is that the action of luetin is specific, but that the proportion of positive reactions obtained was much smaller than that obtained by NOGUCHI. The author attributes this either to imperfect storage impairing the reliability of the sample, or difference of treatment of the patients. It is concluded that when performed in conjunction with the Wassermann reaction the luetin test is of great value. The 130 syphilitic cases are tabulated, with information as to the duration of infection, the principal features, the stage and the result of the two reactions.

Medical entomology.—A short report is furnished by Dr. STANTON. The contents have been published in papers already reviewed.

The Report closes with sections on the precipitin test for the origin of blood stains, the problem of rat destruction (wherein is shown the uselessness of viruses), and an account of the examinations carried out in the laboratory.

A. G. B.

LEVY (R. L.) & ROWNTREE (L. G.). **On the Toxicity of Various Commercial Preparations of Emetin Hydrochlorid.**—*Arch. Intern. Med.* 1916. Mar. 15. Vol. 17. No. 3. pp. 420-443. With 8 figs.

The authors commence by giving details of two cases treated with emetine. The first, a case of chronic amoebic dysentery, received 29 grains in 20 days and suffered from diarrhoea, muscular weakness and acute renal insufficiency followed by death. The other, an anaemic woman with pyorrhoea alveolaris, received 2 grains spread over four days and recovered after diarrhoea with blood and pus in the stools and toxic delirium. Experiments were made on 62 animals, dogs, cats and rabbits, and five commercial preparations of emetine hydrochloride were investigated. Points particularly observed in the animals were: (1) toxicity, (2) effects on the circulation and respiration, (3) pathological changes, (4) effect on the coagulation of the blood, (5) effect on renal function and the development of acidosis. These points are discussed in turn, and a series of graphs is given.

The authors give a summary of previous experimental work from MAJENDIE and PELLETIER (1817) to LOWIN (1902). Their own pharmacological and pathological findings were in accord with those given in the summary. Two new facts are that by electro-cardiographic studies it has been shown that the cardiac irregularity produced by emetine poisoning is due to fibrillation of the ventricles, from which the animals may recover, and Professor HOWELL has shown that there are alterations in the clotting properties of the blood.

A section follows on the ill effects following the clinical use of emetine. The authors have collected 20 cases, which they tabulate; in six of these less than ten grains were given. All recovered but their

own case. The symptoms included diarrhoea with blood (4 cases), diarrhoea (3 cases), peripheral neuritis (5 cases), muscular paralysis (1), muscular weakness (1), purpuric eruption (1), toxic delirium (1). The following suggestions are presented :—

“Patients may differ markedly in their susceptibility to the drug, and the various commercial preparations vary widely in toxicity. . . . The treatment should be given in courses, at intervals of several days or a week. The subcutaneous route is the one of choice. Individual dosage and the duration of each course must be determined by the exigencies of the case. One-third grain three times a day for a week or ten days is usually a safe dosage in amoebic infections. It is rarely necessary to give more than $1\frac{1}{2}$ grains daily. In the treatment of pyorrhoea, Bass and Johns advocate $\frac{1}{2}$ grain daily for from three to six days, and maintain that no case need have more than six days’ treatment. Under ordinary circumstances this seems well within the margin of safety. It must be borne in mind, however, that the administration of even relatively small doses over a long period of time may prove harmful. . . . Intravenous injections should be employed only in extreme cases. If this mode of administration seems imperative, small doses, well diluted ($\frac{1}{2}$ grain in 100 cc. salt solution) should be slowly given, and the blood pressure should be carefully observed during the injection.”

[In those cases in which peripheral neuritis was attributed to emetine administration it is not stated whether due consideration was given to the fact that this condition has been stated to occur after dysentery, irrespective of emetin.]

A. G. B.

BALFOUR (Andrew) & PYMAN (Frank Lee). **The Toxicity of Emetine.**
—*Jl. R. Army Med. Corps.* 1916. Jan. Vol. 26. No. 1. pp. 35–42.

This is a compilation for the benefit of medical officers serving with the Army. An account is given of the meaning of “emetine,” at first applied to a mixture of substances, and of the formulae which have been attributed to it. CARR and PYMAN showed that it is a mono-methyl ether of cephaeline and has the formula $C_{29}H_{40}O_4N_2$. Emetine hydrochloride, $C_{29}H_{40}O_4N_2 \cdot 2HCl$ is readily soluble in warm water, one part in about four parts of water at body temperature. Aqueous solutions can be sterilised without becoming decomposed. An account is given of the action of emetine on various animals, and what is known of the toxicity of emetine to man is reproduced. The authors write :—

“Medical officers treating cases of amoebic dysentery with emetine will do well to remember :—

“(1) That emetine is a very costly drug.

“(2) That if it is going to do good its beneficial action is generally quickly apparent.

“(3) That it is useless, unwise and wasteful to subject patients to repeated, long-continued courses of the drug. We know very little about the possible cumulative effect of emetine. There may be none, but in any case two short courses of the drug in appropriate doses will *usually* suffice to cure a case of amoebic dysentery. This would necessitate a primary administration in all of from ten to fifteen grains and accords with the experience of Low in his recent article on the treatment of amoebic dysentery [see this *Bulletin*, Vol. 7, p. 199].

“(4) That emetine may itself produce and keep up a certain degree of diarrhoea and that it is important to distinguish this drug-produced diarrhoea from that caused by intestinal disease.”

Attention is drawn to Dr. DALE’s paper, in the *British Medical Journal* [*loc. cit.*, p. 237].

A. G. B.

SILER (J. F.). **Medical Notes on Jamaica,* British West Indies. Part One: General Information concerning Jamaica. Its Prevailing Diseases.**—*Amer. Jl. Trop. Dis. & Prevent. Med.* 1916. Feb. Vol. 3. No. 8. pp. 433-458.

In 1913 Dr. SAMBON invited the Thompson-McFadden Pellagra Commission to take part in an expedition to the West Indies for the purpose of investigating the epidemiology of pellagra. The author and Mr. JENNINGS undertook the journey and reached Jamaica in September 1913. The position and size of the island are described. It contains 4,200 square miles [about half the size of Wales]. It is mountainous, the highest peak having an altitude of over 7,000 feet; it has consequently a large range of temperature. Springs abound along the coast, but in districts in the middle of the island it is at times very difficult to secure water at all. In such districts the peasants may have to walk from 10 to 20 miles in years of drought. In one of these sections an extensive focus of pellagra was found. The population (1911 census) consists of white, 15,600, coloured and black, 793,000, East Indian, 17,300. The birth-rate for 1912 was 39 per mille, the death-rate 22.1 per mille. The East Indians are indentured coolie labourers; more than 15,000 of them have resided in Jamaica for more than ten years. The principal exports are bananas and other fruits, bananas being by far the most important. The houses are constructed of wood, are of one story and consist of one to two rooms; the ventilation is poor, and at dusk every door and window is tightly closed. The barracks for the indentured labourers are sometimes superior in construction, but not as a rule. The methods of disposal of human excreta vary from a water carriage system in the upper circles to a pail system in some of the institutions and no system at all in the country. Soil pollution is universal. An account is given of the staple foodstuffs. The organisation of the medical service is described; it is considered to be excellent. Besides two hospitals at Kingston, a lunatic asylum and a lepers' home, there are 28 district hospitals. During the year 1912 27,000 patients were treated in these hospitals, of whom 18,000 were indentured coolies, that is to say two-thirds, though the coolies only make up two per cent. of the total population.

Prevailing diseases.—*Syphilis* and *yaws* are very common. *Yaws* is believed to be commoner in the Jamaicans than in the indentured coolies. In the year 1912 over 10,000 persons received treatment, which in 349 cases consisted of salvarsan.† The medical men are enthusiastic advocates of this treatment, as is shown by extracts from a local report. *Malaria* ranks highest among diseases as the cause of admissions to hospital. During the same year the total admissions to district hospitals were 8,599. The disease occurs with greatest frequency in the north-eastern portion of the island, which is given largely to the cultivation of bananas. "The superintending medical officer expresses the opinion that the cultivation of bananas and malaria go hand in hand and that the necessary trenching required in banana culture furnishes excellent breeding places for mosquitoes."

* For a similar account of Barbados see this *Bulletin*, Vol. 6, p. 349.

† In 1915 Dr. A. A. ANDERSON reported that 1,127 cases had been cured by salvarsan or neosalvarsan in the operations of the travelling dispensary.

In this part of the island practically all admissions for malaria are labourers from banana estates. *Anopheles albimanus* is the principal carrier; five other malaria transmitting mosquitoes occur. Malaria prophylaxis is not practised systematically. Mosquito control work is considered to be prohibitive under prevailing economic conditions.

Both bacillary and entamoebic types of *dysentery* are common. The most common method of spread is probably through the medium of drinking water. *Mossy foot* was observed with great frequency in the almshouses and general population; its etiology is unknown. *Filariasis*, except for imported cases, is unknown in Jamaica, though the transmitting agent, *Culex quinquefasciatus* [*fatigans*], has a fairly wide distribution. A disease known as *neuritis* prevails and appears to be endemic. None of the cases show symptoms similar to those of the wet type of beriberi in the Far East. If VEDDER is correct in the opinion that the wet and dry types of beriberi are due to different deficiencies, this would account for the absence of the wet type in Jamaica. The author notes that beriberi does not affect the population of Barbados, so that a comparative study of conditions in these two islands might throw light on the nature of the neuritis of Jamaica. Data are given of the incidence of *vomiting sickness*, with an extract covering nearly four pages from an old report of Dr. H. Harold SCOTT [for this author's more recent views see this *Bulletin*, Vol. 6, p. 426].

Typhoid fever is common. In the year 1912, 259 cases were registered of which 85 came from Kingston. Other cases were treated in the district hospitals. The disease is endemic in all parts of the island. *Tuberculosis* is quite common, the poor ventilation of the huts tending to facilitate its spread. *Ainlum* is not uncommon. *Schistosomiasis* is reported as extremely rare. As regards *hookworm* disease, of 885 specimens examined from various parts of the island 80 per cent. were positive for hookworm ova (SCOTT). Of 1,376 short term prisoners examined 71·5 per cent. were positive. Only two showed any marked signs of anaemia. Opinion differs as to the effect this disease has on the population from an economic point of view. The author considers that the eradication of the infected in Jamaica would be a most difficult problem. In the *leper* asylum there are 111 inmates. Parasitic diseases of the skin are very common; those of most common occurrence are *tinea imbricata*, *ichthyosis*, *psoriasis* and *dhobi's itch*. A scaly marbled condition of the skin of the feet and legs, which is very common, is attributed to irritation incident to walking bare foot in the grass in the early morning hours when heavy dew is present.

A. G. B.

MACFARLANE (R. M.). **The Sanitation of a Small European Settlement in Portuguese East Africa; with Notes on some of the Diseases prevalent in the District.**—*Trans. Soc. Trop. Med. & Hyg.* 1916. Mar. Vol. 9. No. 5. pp. 129-156. With a map and 1 plan.

In April 1913 the author was sent by the Church of Scotland Blantyre Mission to open up a new station in Portuguese East Africa. The station lies about 160 miles east of the Nyasaland border and about 30 miles south of the 15th South parallel of latitude in the Portuguese district of Alto Mòlôcuê about 2,800 feet above sea level. A table

of temperatures and rainfall for 1914 is given. It is seen that the mean monthly temperature ranged from 65.1° (July) to 81.5° (December) and that the months May to October inclusive were dry. The district was first occupied by the Portuguese six years ago.

The first consideration in the selection of the site was naturally the freedom of the locality from the breeding places of mosquitoes. A map shows the relation between the position of the dwelling houses and that of the garden and the well from which the water supply was drawn; mosquito-breeding grounds are indicated. Mosquitoes were never numerous; the majority were Anophelines. Several cases of malaria occurred in the first half of 1914, the greatest incidence being at the end of the rains. One of the Anophelines appears to be *Myzomyia funesta*, shown by DANIELS to be the chief malaria carrier in Nyasaland. Parasites were always present in the station natives. On one occasion they were found in six out of 29. The author gives details of the measures taken to get rid of the mosquitoes. Oiling of the pools was not found practicable.

In order to get an idea of the extent and nature of the malaria he examined in January (mean temp. 80.2°) 84 children from the nearest village, two-and-a-half miles away. The results are given in a table. The ages varied from one-and-a-half months to fourteen years. Malarial parasites were found in 85.7 per cent. and palpable spleen in 72.6 per cent. Of the 72 positive blood slides 40.2 per cent. showed malignant tertian parasites, 59.7 simple tertian, 8.3 quartan. There were 10 cases of mixed infection and gametocytes were found in six cases. In the case of five children who showed no sign of malaria a leucocyte count was made (500 leucocytes counted). The large mononuclears ranged from 26.4 to 52.6, which, the author notes, is exceptionally high and undoubtedly due to malaria infection. He notes that at Blantyre simple tertian is rare, the malignant tertian being the common form. As illustrating the danger of diagnosing malaria from the presence of parasites in children he cites the case of a child he treated who returned on the following day with a smallpox eruption.

The faeces of 200 natives were examined for intestinal parasites and a table is given showing the number of ova of each parasite found. As the author had no hospital he had difficulty in obtaining specimens. Ova of ankylostomes were found in 97 per cent., of *Ascaris lumbricoides* in 64 per cent., and of *Trichuris trichiura* in 14.5 per cent. He notes that of 505 Nyasaland natives examined in Zomba by STANNUS 22.1 per cent. were found infected. If an estimate of the number of worms present may be attempted from the number of ova found, none of these cases were heavily enough infected to be prejudicially influenced. In the stools of ten cases treated he found a number of worms varying from 1 to 138, 14 or 15 being the usual number. In two of three of the more highly infected cases there was some anaemia. Both *A. duodenale* and *N. americanus* were present and in two cases a third species, probably *Tridontophorus deminutus*. As regards *A. lumbricoides*, he says that this parasite is very rare at Blantyre. An account is given of the hygienic measures, with a plan of the latrine used.

The conclusions are as follows :—

“ In so far as the work recorded in this paper lends itself to the forming of conclusions, these may be summed up as follows.

"*Malaria*.—The endemic index of the district is over 90, and is probably 100. The commonest parasite appears to be *Plasmodium vivax*, the simple tertian form. Native children may harbour large numbers of parasites in their blood without symptoms.

"*Ankylostomiasis*.—At least 97 per cent. of the population harbour *Ankylostoma duodenale* or *Necator americanus*. The latter appears to be the commoner parasite. The majority of the population are merely carriers.

"*Ascariasis*.—Over 50 per cent. of the population harbour *Ascaris lumbricoides*—adults and children alike.

"*Trichuris trichiura*.—This worm is not nearly so common as the preceding one. It is present in small numbers in about 14 per cent. of the population.

"*Schistosomiasis*.—The urinary form of this disease is common, but the rectal form has not been found, locally contracted.

"*Taenia*.—Tape worms exist, but their frequency and species have not been accurately determined.

"*Oxyuris vermicularis*.—This parasite is probably widely distributed, at least in small numbers.

"*Spirochaetosis*.—African tick fever is probably not endemic in the district.

"*Trypanosomiasis*.—Sleeping sickness is not known to exist in the Alto Mòlôcûé district. Tsetse fly is sparsely distributed."

A. G. B.

CAVALLINI (ENRICO). *Missione sanitaria ad Adalia*. [A Sanitary Mission to Adalia.]—*Ann. Med. Nav. e Colon.* 1916. Jan.-Feb. Vol. 22. Nos. 1-2. pp. 50-54.

Brief notes of a two-and-a-half years' stay by the author at the Turkish port of Adalia, or Antalia, in Anatolia. The town contains about 35,000 inhabitants, of whom 25,000 are Mussulmen, and most of the remainder Greeks. The situation is picturesque and the soil fertile; the water supply abundant, but polluted owing to municipal neglect. The sanitary conditions are those of most other towns under Turkish rule, that is to say, very bad, and disease is therefore prevalent, the author having treated as many as 22,000 cases of illness during his stay. The principal complaints are malaria, syphilis and other venereal diseases, trachoma, and tuberculosis. The Turks suffer much more from venereal disease than the Christians, from the majority of prostitutes being Mussulman in faith, generally married women, deserted or divorced by their husbands, and also repudiated by their own families. No prophylactic measures whatever are taken against the spread of phthisis, and of enteric the author observed as many as 250 cases during his stay. From what the author states, it would appear that an attempt had been made to establish an Italian medical mission in the place, which had to be abandoned on the outbreak of hostilities.

J. B. Nias.

i. KERMORGANT. *Protection de l'enfance indigène dans les colonies autres que l'Algérie, le Maroc et la Tunisie*.—*Bull. Acad. Méd.* 1916. Feb. 3 ser. Vol. 75. Year 80. No. 7. pp. 178-195.

ii. PINARD (A.). *De la communication de M. Kermorgant sur "La Protection de l'enfance indigène dans les colonies autres que l'Algérie, le Maroc et la Tunisie."*—*Ibid.* Mar. No. 13. pp. 346-352.

i. The author begins with some general observations. He points out the wonderful results of vaccination against smallpox in Cochín

China. In 1885 the population of that country was estimated at 1,790,000; in 1896, after vaccination had been carried out on a large scale, it was 2,262,000 and in 1908 4,000,000. He adds that this is one of the most thickly populated French colonies. He points out that in Annam, Madagascar, Oceania and West Africa there are no such things as foundlings. Any child without parents is brought up by someone else in his village. The death of children is often caused by ignorance or lack of skill on the part of the mothers. The midwives are very dirty and very ignorant. Lactation goes on to the second, third, fourth or even fifth year, but a few days after birth the infant gets rice, manioc, yams and bananas, chewed and passed from mouth to mouth, a proceeding which, as he points out, conduces admirably to contagion. Thus numerous infants born healthy become victims of tuberculosis, syphilis, etc. The solid food also gives digestive troubles leading to athrepsia. In many of these countries the infants are almost naked and insufficiently protected against variations of temperature. He proceeds to pass in review the attempts made to check the mortality amongst children in the various French colonies, giving incidentally the causes.

Madagascar.—Before the French occupation syphilis and malaria caused many still births and with tetanus occasioned great mortality amongst infants. The three diseases which were more recently chiefly responsible are those of the respiratory passages, smallpox and malaria. In the interior the thermometer goes down in July and August to zero and the children are insufficiently protected; not infrequently father, mother and one or more children living in a badly ventilated hut are attacked by pneumonia at the same time. He draws attention to the habit on the part of the attendant of receiving the sputa into his hands. Smallpox and malaria are now dealt with in appropriate ways.

In 1898 the infantile mortality up to five years was 40 per cent. of the general mortality. The following measures were taken:—Regularisation of marriages and severe penalties for repudiation; a tax on the unmarried not contributing to the subsistence of a child; exemption from taxes of fathers of five children; exemption from military service of all fathers; the institution of an annual fête when gifts were made to the mothers of the largest families. In 1912 475 mothers with eight living children apiece were rewarded. A school of medicine for natives was formed; hospitals, dispensaries, and orphanages were started in all the provinces. Other medical measures are detailed. Syphilis, and consequently abortion, was extremely common at that time; infected women were estimated at 90 to 95 per cent. When it was found that with specific treatment women who had previously had several miscarriages went to term, many of them came for consultation and also brought their husbands to be treated. In 1903 lying-in hospitals were started (in 1909 there were 72), and a corps of native midwives was organised; of these there are now 72.

Indo-China. From 1627 onwards schools, hospitals, dispensaries and crèches were founded by the missionaries, especially in Cochin China. An account is given of the numerous homes, orphanages, schools, crèches, lying-in hospitals, etc., started since 1853. The lying-in hospitals are considered the most useful. A school for midwives was recently formed. Measures were taken to prevent tetanus.

from infection of the cord, the principal cause of the mortality of infants in that country. Other causes are given as, enteritis due to improper diet, stuffing with chewed rice, and epidemics of cholera, malaria, plague and smallpox. It is noted that the infantile mortality reaches 15 per cent. in the first month and 40 to 50 per cent. in the course of the first year.

Similar details are given for *Martinique, Guadeloupe, French Guiana, Reunion* and *New Caledonia*. In the last colony there is a committee which gives a prize of 10 francs for every living baby born in the colony. It is noted that leprosy affects a fifth part of the native population. A large number of European and native children are attacked and it is a common thing to see leprosy children share a bed with their healthy brothers and sisters. In this colony the birth-rate is low and sterility is often produced by attempts at abortion. Marriages are made very young.

After some remarks on *Tahiti* and the *Marquesas Islands*, in which the population seems to be disappearing, the author comes to *Senegal*. Here infantile mortality is attributed, amongst other things, to the disastrous practices of the marabouts and native midwives who, by their want of skill, often make it impossible for the mothers to bear more children. Diarrhoea, insufficient clothing and improper feeding are said to be powerful factors in the infantile mortality.

Upper Senegal & Niger and *Mauritania* are next dealt with and then *Equatorial Africa*. Here no preventive work is being done and there are no statistics. The death-rate and birth-rate vary very much in different parts of the country. Prolonged lactation, polygamy and abortion are given as the most frequent causes of sterility, with marriage before completion of development.

French Possessions in India.—The number of infants who succumb in the first eight days to convulsions is large. These are due to tetanus acquired through improper treatment of the cord, which is dressed with clay or cow-dung. Other causes of mortality are given as diarrhoea, smallpox, cholera, malaria, round-worms, tuberculosis, syphilis. Still-births are given as 22.5 per cent !

ii. Pinard, who discusses M. KERMORGANT's paper, confines his remarks to Madagascar and Indo-China. He attributes the measures taken in Madagascar to General GALLIENI. He states that at Tananarive in 1901 eight medical inspectors were appointed for young children and pregnant mothers. There were weekly consultations for these and for women with venereal diseases or diseases peculiar to the sex, to the exclusion of all other persons. He points out that French towns might copy the example of Tananarive, where for 15 years children have been protected both before and after birth. The inferior results in Indo-China are attributed to defective organisation. At Tananarive (population in 1911, 70,000) in 1900 the birth-rate was 38, in 1901 45, in 1902 47 and in 1903 51 per thousand inhabitants. This is contrasted with France's 25 per mille.

A. G. B.

BARRY (C.) & CRUMP (S. T.). *Notes on Emergent Abdominal Surgery*.—*Indian Med. Gaz.* 1916. Feb. Vol. 51. No. 2. pp. 50-58.

The authors, who are Medical Superintendent and Assistant Medical Superintendent, respectively, of the Rangoon General Hospital, give

figures representing the "emergent abdominal surgery" performed on native patients at that hospital during the last five years. A table shows that there have been 433 such cases, of which the chief items are:—

Strangulated hernia	141
Acute appendicitis.....	106
Penetrating abdominal wounds	50
Acute general peritonitis	48
Internal intestinal obstruction	46

The authors note that hernia is by no means uncommon amongst the coolie classes. During the last five years 546 operations for the radical cure of hernia have been performed. The great majority of these cases were Hindu coolies from Southern India; only a very few were Burmans. Inguinal hernia formed all but four per cent. of the cases.

As regards internal intestinal obstruction the most frequent causes were bands, 20 cases; volvulus, 11; intussusception, 8. No case of the latter was met with in natives under the age of 20. It is noted that out of 669 cases of intestinal obstruction collected at the London Hospital intussusception claimed 189 or 28 per cent. The authors in an experience extending over 18 years cannot remember ever having been called upon to treat a case of this mishap among native children. They note that native mothers universally suckle their children and often for a period of two years or more which is possibly a factor of importance. Only four cases of obstruction were due to organic stricture. "The intestinal tract in natives, except at its very commencement and at its extreme end, appears to enjoy remarkable immunity from cancer." Out of 5,946 occasions in the last five years when the intestinal tract of natives was thoroughly explored either by operative measures or on the post mortem table, in only one case was cancer discovered other than that of the stomach or rectum. Lt.-Col. NIBLOCK is quoted to the same effect. The authors contrast this with the statistics from England. Out of 669 cases of intestinal obstruction at the London Hospital no less than 151 were due to cancer. The authors ask if there is any explanation of the immunity from cancer of the intestinal tract in natives. They assign, as at least a predisposing cause of cancer in this region in Europeans, stasis of intestinal contents, and think that stasis is uncommon amongst natives. Constipation is rare and the intestinal tract is thoroughly emptied. But this opinion is expressed with diffidence.

There were two cases of intestinal obstruction due to balls of round worms. They think that a course of anthelmintics should be given to all patients about to undergo a set operation on the intestinal tract.

Appendicitis, as the figures show, is by no means rare in natives, but whereas in London 40 per cent. of cases occur between 10 and 20, in the natives at Rangoon nearly half the cases occurred between 30 and 40 and only four per cent. between 10 and 20.

The authors are of opinion that ulcer of the stomach and duodenum is decidedly more common amongst natives of India than their operative statistics indicate. They lay stress especially on the important

surgical aspect of chronic dysenteric ulceration as a cause of general peritonitis. In the last five years deaths from peritonitis have been associated with the following dysenteric lesions :—

Acute gangrenous amoebic dysentery	36 cases
Perforated amoebic dysenteric ulcers	4 „
Ruptured liver abscess (amoebic)	2 „
Abscess about sigmoid flexure, probably amoebic	2 „

44 cases

They mention also the simulation of appendicitis by large chronic dysenteric ulcers of the caecum and the production of severe intestinal haemorrhage subsequent to some abdominal operation, controlled only by prompt use of emetine injections. The surgeon, they write, will do well to weigh carefully the importance of a history of an attack of chronic dysentery before deciding upon an abdominal operation. The paper contains several valuable tables.

A. G. B.

BAETZ (Walter G.). A Number of Surprises for the Diagnostician as Revealed by the Pathologist.—*Proc. Med. Assoc. Isthmian Canal Zone.* Apr.-Oct. 1914. Vol. 7. Pt. 1. [1916]. pp 126-138.

These were cases admitted to the Ancon Hospital, Canal Zone, which came to autopsy. One or two passages are worth extraction. There were four missed cases of entamoebic abscess of the liver, a disease which the author says is the bane and fear of the internist. He writes :—

“ One is impressed with the variety of conditions for which hepatic abscess is mistaken. This is not surprising when we consider that there is no definite symptom complex of this curse of the tropics that is not found more often in other causes of hepatic enlargement. Until diagnosis by röntgenology and a serum ferment test become practical possibilities, there will always be cases slowly dying under our very eyes, in whom past history as to dysentery, temperature records, physical examinations, the absolute and the differential blood count, stool examinations, aspiration of the afflicted organ, and even exploratory laparotomy have deceived us.”

There are several cases which illustrate the danger of attributing a patient's illness solely to malarial parasites that may be found in his blood, in those parts of the tropics where practically all natives harbour parasites. Here is one :—

“ A tropical negro boy, seven years of age, was admitted in a semi-comatose state. The history given by the mother was that he has been sick for three weeks with palsy of the left arm and leg. Ten hours before seeking hospital treatment the boy had begun to vomit and had lapsed into semicoma. When roused he spoke disconnectedly and in a decidedly slurring fashion. The white blood count was 13,600. The thermometer registered 100° F. After a tedious search, estivo-autumnal parasites were found in the patient's blood. One reads a good deal of pernicious malaria producing local palsies and hemiplegias but the pathologist usually finds a better explanation for such definite focal signs. Keeping this bit of experience in mind, the patient was subjected to a spinal puncture in addition to being treated for pernicious malaria. Although the cerebro-spinal fluid proved negative both in culture and cytology, the pressure was so decidedly increased that when the patient died on the third day, a

diagnosis of simple meningitis was given preference over the malaria diagnosis. The autopsy brought to light a cystic parencephalus involving the pons, crus cerebri, medulla, and cervical portion of the cord. Internal and external hydrocephalus were marked. A chronic malarial infection with a few parasites in the spleen and the bone marrow was found, and the possibility of another delusion concerning malarial hemiplegia had been dispelled by the pathologist."

A. G. B.

STRONG (W. M.). The Causation of So-Called Tropical Anaemia.—
Trans. Soc. Trop. Med. & Hyg. 1916. Jan. Vol. 9. No. 3.
pp. 97–100.

Persons who have lived long in the tropics become anaemic looking. This is not due to deficiency of haemoglobin nor is it probable that ischaemia of the skin capillaries is the cause, as has been suggested. The author first discusses the optical factors which influence the colour of the skin. The colour of an object depends on the relative amount of each colour of the spectrum which is reflected back to the eye of the observer. The colour of the skin is judged by the light which is scattered by its various layers—the outer epidermis, the pigmented layer, and the true skin with its blood vessels. If either of the outer layers stops light of any particular colour, that colour does not reach the deeper layer and hence cannot be reflected. The author argues that in so-called tropical anaemia less red light than usual reaches the capillary layer and the reason, in his belief, is that the epidermis becomes partially opaque to red light by the deposition in it of pigment. As more pigment gets deposited the skin becomes yellow-brown.

A. G. B.

TROPICAL DISEASES BUREAU.

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TROPICAL DISEASES OF THE SKIN.

BRAULT (J.) & VIGUIER (A.). Deux cas de kerion Celsi observés à Alger et due à une nouvelle espèce de trichophyton à culture faviforme.—*Bull. Soc. Française de Dermat. et de Syph.* 1914-15. July-Dec. Vol. 25. No. 7. pp. 401-402.

The affection was observed in two brothers, aged eleven and five. The elder boy had multiple kerions on the scalp with abundant suppuration and crusts.

In order to obtain pure cultures unimpeded by staphylococci, affected hairs were implanted in the skin of a guinea-pig—from the hair of which cultures were made eight days after inoculation.

The *Trichophyton* obtained from the two cases was an ectothrix megaspore belonging to the faviform group. M. SABOURAUD considered it a new species, and it has been named by the authors *Trichophyton luxurians*.

P. S. Abraham.

BRAULT (J.) & VIGUIER (A.). Trychophyte de l'aisselle observée à Alger, due au *Trichophyton acuminatum*.—*Bull. Soc. Française de Dermat. et de Syph.* 1914-15. July-Dec. Vol. 25. No. 7. pp. 402-403.

A girl aged 17 presented herself with erythematous scaly ringed patches in both axillae, which on microscopical and cultural examination were found to be due to *Trichophyton acuminatum*. Inoculations in a guinea-pig were positive. The lesions had existed for about a fortnight.

P. S. A.

LITTLE (E. Graham). Case of Very Extensive Tinea circinata of Tropical Origin.—*Proc. Roy. Soc. Med.* 1916. Feb. Vol. 9. No. 4. (Dermat. Sect.). pp. 55-56.

This was the case of a British soldier lately arrived from West Africa. The eruption began in the groin in September last, and spread over the greater part of the body. It consisted of large ringed patches and eczematoid surfaces resulting probably from irritation caused by the disease. The nails and scalp were not affected. A plentiful and

coarse mycelium was found in the scales. Cultivation experiments had so far not succeeded. "The fact that the eruption began in the groin and so quickly assumed the eczematoid aspect, and that it nowhere affects the hair, points to the probability that the organism responsible is the *Epidermophyton inguinale*, and if so this case is certainly the most extensive the exhibitor has seen or read of."

P. S. A.

PUPO (João de Aguiar). Um caso de Blastomycose. [A Case of Blastomycosis.]—Ann. Paulistas de Med. e Cirurg. 1916. Vol. 6. No. 1. pp. 8-14. With 6 figs.

A case of blastomycosis ending fatally after a variety of treatments had been tried without success.

The patient was a girl, aged 15 years, with a good family history. Two years before coming under observation she had suffered from an enlargement of glands in the neck, which at first was painless but afterwards proceeded to suppuration. The abscesses were opened surgically, but the glands remained hard and indolent. Rather more than a year afterwards an eruption appeared on the face, and at the same time the glands began to suppurate afresh. On admission to hospital, the eruption was seen to consist of a symmetrical red patch on each cheek, which was elevated and composed of an aggregation of small red or yellow tubercles. The glands of the neck were manifestly enlarged. A Wassermann test for syphilis having given a feebly positive result, an injection of 45 centigrammes of salvarsan was given; but the only result was the production of a violent reaction in the lesions along with pain and fever, and a fresh outburst of suppuration in the glands. The aspect of the patient at this time is well shown in two photographic reproductions.

A sample of the pus from the glands having been drawn off by aspiration it was examined microscopically, and showed, after staining by Giemsa's method and iron-alum, the presence of numerous blastomycetes, having the shape of spherical corpuscles, from 10 to 20 μ in diameter and provided with a nucleus and hyaline capsule. Planted out upon glucose-agar the pus, after an interval of 16 days, gave rise to a growth consisting of separate colonies of the size of a pin's head, and of a dark grey colour. These gradually coalesced, and at the end of two months covered the greater portion of the surface of the medium. In parts the surface of the growth appeared woolly, and was found to contain a mycelium composed of ramifying septate threads containing granules, which terminated in coccidia. Subcultures were made into Hansen's and Mayer's growing solutions for moulds, with the result of obtaining in each case flocculent white growth, which subsided at the end of 40 or 50 days to the bottom of the tubes. Pus, on the other hand, only gave a growth with Mayer's liquid. A piece of the affected skin of the patient was then excised and submitted to microscopic examination after fixing. It showed, upon section, hypertrophy of the epidermis with infiltration of the Malpighian layer, and microscopic abscesses which contained parasites. In the derma beneath were giant cells, some containing parasites. By means of Gram's method it could be seen that some of the parasites were in process of

division, as described by VIANNA, the dividing cells measuring from 15 to 25 μ in diameter and containing from 15 to 20 Gram-positive granules, generally arranged round the periphery of the cell.

As the result of the histological examination it was decided to treat the patient with intravenous injections of iodide of sodium, 20 grammes of a 10 per cent. solution being given every other day; but the only result was to determine an intense local reaction, with further extension of the lesions. Iodide of potassium given by the mouth was equally unsuccessful. Further microscopic examination having shown the co-existence of streptococci in the tissues, four injections of anti-streptococcal serum were given without benefit, and a Wright's vaccine was also tried. Finally ten intra-venous injections of colloidal gold were given without any good result, and the patient at last succumbed from exhaustion. Details of the lesions found at the autopsy are promised in a future communication.

J. B. Nias.

BRIDRÉ (J.). *Sur le traitement des Blastomycoses.* [The Treatment of Blastomycosis.]—*Bull. Soc. Path. Exot.* 1916. Feb. Vol. 9. No. 2. pp. 73-74.

Commenting on ESCOMEL's paper on human blastomycosis in Peru and Bolivia [this *Bulletin*, Vol. 6, p. 136] Bridré remarks that, although arsenical compounds may be without action on yeast fungi, in the human subject, in the epizootic lymphangitis of the horse intravenous injections of arseno-benzol, and novarseno-benzol, have rendered him great service.

J. B. N.

WADE (H. Windsor). *A Variation of Gemmation of Blastomyces dermatitidis in the Tissue Lesion.*—*Jl. Infect. Dis.* 1916. June. Vol. 18. No. 6. pp. 618-629. With 2 plates.

In the course of the microscopical examination of a number of cases of systemic blastomycosis a skin lesion of one case showed, in addition to numerous typical budding organisms, an abundance of minute forms suggesting sporulation. When specially stained by Mallory's aniline-blue connective tissue stain, these small bodies were shown to have been formed by the ordinary budding process.

The authors give a short account of the parasites found in the yeast-mould infections, and the differentiation of the budding blastomyces from the spore forming fungus of coccidioidal granuloma. The paper goes fully into the literature of the subject, and minutely discusses the microscopic and cultural characters of the fungus found in the case described.

P. S. A.

MASSEY (A. Yale). *Blastomycosis (?) in Central Africa.*—*Jl. Trop. Med. & Hyg.* 1916. Apr. 1. Vol. 19. No. 7. p. 79. With 1 plate.

In four years the author has observed about twelve cases resembling blastomycosis as described in books. Salvarsan has no apparent effect, thus excluding syphilis and yaws. Local applications were of no avail, but curetting had a good effect in one case. No cultures have been made.

The natives call the disease "Mulandula," and say that it may attack any part of the body and is incurable. Photographs of two cases—in each one leg being affected—are given.

P. S. A.

SARTORY (A.). *Présence du Sporotrichum beurmanni* De Beurm. et Goug. sur un épi de blé.—*C. R. Soc. Biol.* 1915. Dec. 31. Vol. 78. No. 20. pp. 740-742.

The fungus, observed on an ear of corn obtained in the neighbourhood of Nancy, was cultured on simple gelatin and Sabouraud's peptone glucose jelly, and yielded in eight days a ramifying mycelium with conidia grouped in glomeruli and with pyriform spores. On subculture on Sabouraud's and other media the characters showed the fungus to be probably identical with the human *Sporotrichum beurmanni* and this was confirmed by other tests and by the microscope.

Its pathogenicity was studied in rats—the virulence, at first small, being augmented by passing from rat to rat. It is interesting to have found *Sporotrichum beurmanni* as a saprophyte in nature—thus confirming GOUGEROT, who after three years systematic search met with it twice on the bark of a beech tree and a horse tail growing beneath near Termignon and on dried grains of oats near Chamounix.

P. S. A.

LECOMTE (A.) & HECKENROTH (F.). *Traitement et évolution d'un Mycétome à grains rouges.*—*Bull. Soc. Path. Exot.* 1916. June. Vol. 9. No. 6. pp. 346-351. With 1 plate.

This is a further account of the case reported by Dr. JOUENNE [see this *Bulletin*, Vol. 7, p. 128].

The tumour, larger than a man's head, was situated on the right knee and extended around to the popliteal space. The surface was nodulated and showed numerous fistular openings, exuding a more or less purulent and sanguineous fluid containing in suspension red grains of irregular form and from $\frac{1}{10}$ to $\frac{2}{3}$ m.m. in diameter. The general consistence of the tumour was firm and it was only tender on the posterior and internal part. The articulation of the knee was not affected, extension was normal and flexion only hindered by the size of the tumour behind. The crural glands were enlarged and hard, but not painful.

Under iodide of potassium in increasing doses of 2 to 6 grammes, the growth became much smaller in a few weeks, but diarrhoea set in and subsequently chest trouble developed and the patient died in six months.

P.m., tuberculosis was found in the pleura, pericardium, etc., and spleen and liver. No mycelial filament or spores of *Nocardia Pelletieri* were found in the internal organs.

The tumour had gradually diminished and almost disappeared, measuring now only 38 cm. around, and red grains could be found only in one place.

The patient had succumbed to a generalised tuberculosis, the course of which had probably been precipitated by the iodide treatment, but the case is interesting as showing the favourable effect of the drug on the mycetoma.

P. S. A.

CLEGG (M. T.) & HOBODY (W. C.). **A Case of Mycetoma in Hawaii: Its Etiology.**—*Amer. Jl. Trop. Dis. & Prevent. Med.* 1916. Apr. Vol. 3. No. 10. pp. 534-544. With 1 plate.

The authors of this good account of a case of Madura foot in Hawaii quote BOYER and SURVEYOR's description of the disease in India, and especially describe the streptothrix fungi cultivated by VINCENT and others.

The Hawaiian case—of the ochroid variety of the disease—which they report, was that of a native fisher woman whose left foot had been affected for five years after an injury on the sole from the coral. The painful swollen spot gradually enlarged developing sinuses with yellowish discharge, until the foot became extremely painful, twice the size and with numerous crater-like nodules on both surfaces and degeneration of all the tissues.

The streptothrix found in the yellow granules in the discharge and tissues resembled the "*Streptothrix maduræ*" of VINCENT culturally and in staining reactions. It seemed to be but slightly, if at all, pathogenic in guinea-pigs, rabbits and monkeys.

A resumé is given of the cases of mycetoma occurring in America. The authors consider that the disease is a clinical type or variety of streptothricosis—"Streptothricosis pedis"; and that more than one species of streptothrix may produce the affection.

P. S. A.

BURRES (W. T.). **Mycetoma in Western Panama.**—*Amer. Jl. Trop. Dis. & Prevent. Med.* 1916. May. Vol. 3. No. 11. p. 610. With 1 plate.

A native of Chiriqui near the Costa Rica border, aged 50, gave a history of a wound in the foot 16 years previously, with subsequent development of a "wart" which slowly increased in size and the other foot became affected. When seen, sinuses and purulent discharges were "gradually honeycombing the feet." He gave no history of framboesia, syphilis or tuberculosis.

No account of the fungus causing the infection nor any microscopical data are given. It may be doubted indeed whether the case was really one of mycetoma. The illustration might well pass for some other affection.

P. S. A.

CATSARAS (Johannes). **Bemerkungen über neue Fälle von griechischem Myzetom. (Zweite Mitteilung).**—*Arch. f. Schiffs- u. Trop.-Hyg.* 1915. Dec. Vol. 19. No. 23. pp. 617-625. With 1 plate & 3 figs

The author gives an elaborate account of the microscopical structure of material from a case of mycetoma in a woman from Messini (Peloponnesus). The fungus differs from that found in his previous cases; the polymorphism being more defined, and the staining reactions rather different.

He alludes to BRUMPT's classification of the Madura foot fungi, viz:—(1) *Indiella mansonii*, (2) *Indiella reynieri* Brumpt, and (3) *Indiella somaliensis*, and considers that his first and last cases belonged to

the second category. A fourth case of Dr. MAKRYKOSTAS's, also in a young woman, who came from Melos, with a characteristic growth commencing in the sole of the left foot, is also described. The fungus in this, as in the second Greek case was shown to be the "*Streptothrix maduræ*."

The main conclusions are that :—(1) The occurrence of this tropical affection in native Greeks who have never been out of the country shows that the disease is indigenous ; (2) the fact that the cases came from different parts of the kingdom indicate its wide distribution ; (3) in the four cases three different kinds of fungi were found, which confirms BRUMPT's opinion that the disease may be caused by very different forms of mycelial growths.

P. S. A.

VADALÀ (Paolo). *Nuovi casi di dermatite di canna*. [Fresh Cases of Reed Dermatitis.]—*Malaria e Malat. d. Paesi Caldi*. 1916. Jan. Vol. 7. No. 1. pp. 14–17.

An account of four cases of dermatitis produced by handling dried reeds (*Arundo donax*), of which two are described at length. In the course of the night succeeding the day on which the reeds were handled the affected individuals, all males, were attacked with irritation and burning of the skin of the face, genitals, hands and arms, and also of the mucous membranes of the nose and throat, with lachrymation, coryza and fever. A certain amount of intestinal disturbance, evidenced by purgation, followed. The irritation proceeded to pustulation on the forearms, while the palms of the hands remained unaffected, probably on account of the thickness of the skin. The symptoms subsided in the course of five days, and were followed by desquamation of the epidermis of the affected areas. One of the patients had three subsequent attacks, at intervals of 15 days, each time on handling the same canes. It was observed that they gave off a black dust, due to the spores of the fungus which causes the symptoms [see this *Bulletin*, Vol. 6, p. 138, for previous references to this subject].

J. B. N.

de BERNADINIS (Virginio). *Ulcera fagedenica dei Paesi Caldi*. [Phagedenic Ulcer.]—*Morgagni*. 1915. May. Vol. 57. Pt. 1. No. 5. pp. 192–200. With 6 plates.

Notes on cases of tropical ulcer observed in natives of North Africa. Two, which were rapidly fatal, occurred in children, and were of the type generally denominated Noma or Cancrum oris. Illustrations are given of both. Vincent's bacillus was isolated in each case with its associated spirillum. Twenty cases of tropical ulcer of the legs were also noted in native soldiers, and in a native boy. From these cases the bacillus described by Le DANTEC as the causative agent of tropical ulcer was isolated in the shape of a straight bacillus, occasionally curved, non-motile, 10μ in length and 25μ in thickness, non-Gram-staining, but easily stained with ordinary aniline dyes. Cultivations were unsuccessful. This form also is illustrated in a micro-photograph.

J. B. N.

CARINI (A.). *Onyxis ulcéreux phagédénique.*—*Bull. Soc. Path. Exot.* 1915. Vol. 8. No. 10. pp. 715-720. With 1 plate.

In this paper an excellent account is given of an affection which seems to have been but little noticed in text-books on Tropical Medicine although it has been known since Dr. MAUREL's observations on the disease in French Guiana, published in the *Archives de Médecine Navale* in 1879, which he called "*Onyxis ulcéreux.*" Dr. Carini has recently had the opportunity of examining a family—a mother and six children—all affected. They were German immigrants who had been three years in Brazil working at a coffee plantation. In each case the ulceration had commenced from a chigoe burrow, gradually increasing, invading the base and matrix of the nails and destroying the latter. They bled easily, exuded a foetid, sanguineous excretion, and were very painful. Microscopical examination showed numerous fusiform bacilli and spirochaetes—just as are found in *ulcus tropicum*.

The disease is particularly given to affect the colonists who go about with bare feet, and generally starts from some small wound or jigger bites and seem to have a preference for the big toe. It is very resistant to treatment; the author has found iodoform a useful application, but extirpation of the nail, curetting and cauterising the ulcer have been recommended as the most efficacious treatment by Dr. DECOURT who has dealt with more than fifty cases.

It is curious that in these cases "*phagedenic ulcers*" in other parts of the body are rare, although the presence of fusiform bacilli and "*Spirochaeta vincenti*" show that the disease must be considered a special localization of "*Tropical ulcer.*"

P. S. A.

BREINL (A.) & PRIESTLEY (H.). *Notes on the Successful Treatment of Ulcerative Granuloma Pudendi by means of Tartar Emetic.*—*Med. Jl. of Australia.* 1916. Mar. 18. Vol. 1. 3rd Year. No. 12. pp. 237-239.

"*Ulcerative granuloma*" appears to be common among the aborigines of North Queensland, the Northern Territory and Western Australia. Treatment with nitric acid, caustics and excision is usually ineffective, even in early cases, and internal treatment with mercury, soamin and salvarsan have also failed. X-ray treatment has been recommended but has not been successful in two cases tried by the authors. This paper records an excellent result obtained by the intravenous injection of tartar emetic as first used by ARAGAO and VIANNA in similar cases in 1913.

The patient in the present instance was an aboriginal girl, aged about 20, who had had the genitalia extensively affected for several years.

The first injection was .06 gram in 30 cc. of sterilised salt solution, and six injections of increasing doses were subsequently given intravenously, and nine afterwards per rectum. Distinct improvement set in after the second injection and after two weeks the whole granulating surface was covered by an epithelial layer. The patient was able to leave the hospital 14 days after the last injection. The success in this case confirms the observation of ARAGAO and VIANNA and justifies further trial of the treatment.

P. S. A.

de SOUZA ARAUJO (H. C.). **Estudo clinico do Granuloma Venéreo. Trabalho do Instituto Oswaldo Cruz. These Inaugural aprovada com Distinção.** [A Clinical Study of Venereal Granuloma. From the Instituto Oswaldo Cruz.]—123 pp. With 7 plates. 1915. Rio de Janeiro: Typ. do Journal do Commercio, de Rodrigues & C.

This is a handsomely got up and very complete essay on the subject indicated by the title, which was presented by the author as a thesis for the degree of Doctor in the Faculty of Medicine of Rio de Janeiro. It is worthy of perusal, by those who are acquainted with the Portuguese language, for the detailed account which it gives of cases of the disease treated with tartar emetic, after the method of VIANNA. A bibliography of 140 memoirs bearing on the subject is appended.

J. B. N.

de SOUZA ARAUJO (H. C.). **O granuloma venereo na America do Sul.** [Granuloma venereum in South America.]—*Arch. Brasileiros de Med.* 1916. Feb. Vol. 6. No. 2. pp. 111-132.

A well-written account of granuloma venereum, according to our present knowledge of this disease. Granuloma venereum was first recognised in South America by NEAL and OZZARD, in British Guiana, in 1892. Since then it has been recognised in Dutch Guiana (P. C. FLU), in Brazil (43 recorded cases), the Argentine (two cases at Buenos Ayres, seen by the author in 1915) and Uruguay (Montevideo, four cases, besides two doubtful ones, observed by RODRIGUEZ and the author jointly, also in 1915).

J. B. N.

KNOWLES (Frank Crozer). **Creeping Eruption (Larva migrans) of the Skin. Particularly in Regard to its Histologic Features, including the Demonstration of the Burrow and the Larva in the Epidermis.**—*Jl. Amer. Med. Assoc.* 1916. Jan. 15. Vol. 66. No. 3. pp. 172-177. With 9 figs.

The author describes a case of "creeping eruption" in a female child aged 20 months, who presented three serpiginous, gyrating lines on the buttocks and pubis. The rate of travel in one case was observed to be two inches in 24 hours. The lines were excised and cut serially in 3,000 sections, and 30 of the latter showed various portions of the larvae—being the first time, it seems, that the larva has been so demonstrated. He widely discusses the whole subject, and refers to the observations of a number of recent writers, but with the exception of LEE's case, reported in 1874, appears to ignore most of the older work on the subject. [In point of fact, a "creeping eruption" due to an oestridian larva, burrowing in or beneath the human skin, has long been known; cases indeed were recorded in Edinburgh more than 60 years ago. Dr. Walter SMITH showed drawings and specimens taken from the skin of a girl in Ireland at the International Medical Congress in 1881, and the reviewer published in the *Medical Press and Circular*, April 12th, 1882, a description and drawing of a larva which had caused a "creeping eruption" in a farmer's boy in Ireland].

As Dr. Knowles says "there is still a considerable amount to be learned in regard to this interesting affection," and he will probably agree that the "creeping eruption" may be caused by the intra- or infra-dermal migration of more than one kind of larvae.

The paper is well illustrated by drawings of the eruption in his case and of the microscopic sections.

P. S. A.

PARHAM (J. C.). **Creeping Eruption. Report of a Case.**—*U. S. Nav. Med. Bull.* 1916. Jan. Vol. 10. No. 1. pp. 103-104. With 1 fig.

This note records a case of creeping eruption, also known as "larva migrans" or "dermamyciasis linearis migrans oestrosa," in a man who had been working in salt water marshes in South Carolina. A red itching lesion about the size of a 25 cent. piece was observed on the right leg. Three days later it began to extend downwards as a slightly elevated line one-sixth inch wide, at the rate of half-an-inch a day. Tincture of iodine locally failed to retard its progress. When, after a week, the man was seen at the dispensary, the line was progressing more rapidly and elevated about one-twelfth of an inch with small vesicles upon it. It had faded at its point of origin, and the active end entered a small indurated and inflamed area. Repeated search failed to find any larva. An intradermic injection of chloroform in advance of the eruption caused the "larva" to turn and go round the injected area, as it had done two days previously after an intradermic injection of phenol. A more extensive injection of chloroform cured the lesion.

The author had the opportunity of seeing a second case of "creeping eruption" at Charleston, in a boy who had three distinct lesions.

The paper is illustrated by an excellent photograph of the lesion in the man's leg.

P. S. A.

JOJOT (C.). **Observation de nodosités juxta-articulaires.**—*Bull. Soc. Path. Exot.* 1916. Apr. Vol. 9. No. 4. pp. 211-212.

The case was that of a young female native of French Guinea, who presented no symptoms of tuberculosis or syphilis. She complained of pain about the tumours which had appeared symmetrically and gradually grown for about two years, on both elbows and both knees. They did not involve the articulations. Treatment with iodide of potassium and mercury for a fortnight had no effect, and one tumour was excised. An elder sister had been similarly affected. These cases are rare in Guinea.

An excellent photograph is appended.

P. S. A.

COMMES (Ch.). **Nodosités juxta-articulaires. Examen histologique.**—*Bull. Soc. Path. Exot.* 1916. Apr. Vol. 9. No. 4. pp. 212-214. With 1 plate.

This paper describes the microscopical characters of the nodule excised by Dr. JOJOT, as well as of two specimens obtained by Dr. FOLEY in Algeria.

On section, the consistence, which is neither osseous nor cartilaginous, appears to be particularly firm, parts being softer and easily torn into thin filaments. It would seem to consist of fibrous nodules embedded in a less dense matrix. Microscopically the nodules are seen to be of fibrous tissue, with sparse connective tissue cells which are more or less degenerated. The fibres have a characteristic arrangement, imbricated and with sinuosities. In some places vessels are seen which present no alteration and numbers of leucocytes are in their neighbourhood. Sometimes the vessels are in the centre of the fibro-connective formations—the cells and fibres being disposed in concentric layers. Staining with Gram and Giemsa gave no result.

Sections of the nodules from Algeria were similar, but the vessels and capillaries were more numerous; they seemed to be the centre of development of each little fibrous nodule. In none of the specimens could be found any parasitic growth—nor the fungus described by CAROUGEAU and FONTOYNONT.

P. S. A.

JEANSELME (E.). *Sur la structure des Nodosités juxta-articulaires.*—*Bull. Soc. Path. Exot.* 1916. May. Vol. 9. No. 5. pp. 287-290.

Dr. Jeanselme remarks upon the wide geographical distribution of these tumours, which he had been the first to observe in 1899-1900 in Cambodia, in Siam and in Laos, and had described under the name "juxta-articular nodosities." They have since been recorded in Java, Indo-China and the Sunda Islands, as well as in Algeria and other parts of Africa and in Madagascar [also lately in Hawaii].

He now describes the histological examination of nodules which had been obtained in Madagascar. The tissue was dense and sections showed three distinct zones: an internal one of degeneration, an external of inflammatory character and an intermediate transitional—the structure being broadly that of connective tissue. The bacteriological examination was negative in sections stained by Ziehl, Gram, eosin, etc. The structure was certainly not that of tubercular or syphilitic growths nor of ordinary fibrous or periarticular bursa transformed into sclerosed nodules. The hypothesis of tophus was suggested, but the position of the small tumours, their indolence, their structure and other clinical characters were against that view.

The author thinks it possible that they may have a parasitic origin.

Mons. JOYEUX's microscopical observations confirmed those of MM. JEANSELME and COMMES and he considers that the amelioration of the disease by potassium iodide is in favour of their mycotic nature.

P. S. A.

BRAULT (J.). *Note au sujet des nodosités Juxta-articulaires chez les indigènes.*—*Bull. Soc. Path. Exot.* 1916. June. Vol. 9. No. 6. pp. 341-343.

The author had recorded cases in Algiers in 1910 and 1911. In this paper he describes three cases, with histological details, two in natives, one in a European. The two former presented themselves for chancroids. The first had the subcutaneous nodules near the trochanters on each side, the tumours being pebble-like, lobulated

hard, movable and painless; stained sections showed a fibro-vascular peripheral zone, and internally lobes of adipose tissue between fibrous bands; no micro-organisms could be demonstrated. In the second case, there was one nodule the size of a walnut, near the left great trochanter, mobile, but attached by a fibrous band to the trochanter. It had given no pain nor trouble and had existed since childhood. Histologically it was entirely formed of fibrous tissue with masses of cells here and there—leucocytes, embryonic cells and occasionally giant cells in the centre of the masses. In many places epithelial cells were massed around the vessels, reminding one of the condition in tuberculosis. With Ziehl's and other colouring methods no micro-organisms could be found.

The third case had a larger tumour in the trochanteric region—the centre being filled with a semi-liquid whitish mass, with a fibrous wall. Here also no micro-organisms could be found.

After considering his own cases and the description of JEANSELME, GROS, NEVEUX, FONTOYNONT and CAROUGEAU, the author considers that the juxta-articular nodules met with in the colonies have not all the same origin, and that further study is necessary.

P. S. A.

McCoy (George W.) & HOLLMANN (Harry T.). *Juxta-Articular Nodules.*—*Amer. Jl. Trop. Dis. & Prevent. Med.* 1916. Feb. Vol. 3. No. 8. pp. 458-459. With 1 plate.

The authors report apparently the first case observed in Hawaii. The nodules were located on the extensor surface of the elbows of a full-blooded Hawaiian woman aged 45. One nodule below the left olecranon had existed for 30 years, two nodules on the right arm had only been noticed for one year. The older measured 3 cm. by 2 cm. and 2 cm in height, the others were much smaller. They were all smooth, hard, movable and not tender, and had developed slowly. The woman, who was in good general health, stated that a number of persons living in her district had similar nodules, some of them being on the ankles and knees.

P. S. A.

CASTELLANI (Aldo). *Note on Dermatitis cupuliformis.*—*Jl. Trop. Med. & Hyg.* 1916. Feb. 15. Vol. 19. No. 4. p. 41.

Professor Castellani describes a new disease which he calls Dermatitis cupuliformis or "tropical ecthyma."

It begins with superficial, dusky-red, slightly itchy spots, generally follicular or perifollicular, often mistaken for mosquito bites, and usually situated on the feet and legs. Some may disappear, while others slowly increase in size, become raised and infiltrated, but without vesication or pustulation. On the feet especially they often become cupuliform with subsequent formation of an ulcer in the centre with undermined edges. They may reach the size of a small cherry. The ulcers are painful and slow to heal. The condition is common in young European planters.

From the non-ulcerative lesions a pure culture can be obtained on agar of a streptococcus biologically different from all other streptococci

hitherto isolated in Ceylon. It is Gram-positive, does not liquefy gelatine and does not produce indol. Dr. Castellani has given it the name "*Streptococcus tropicalis*."

The malady can be experimentally reproduced by inoculation of pure culture into and around hair follicles.

The nodules may be mistaken for (1) Oriental sore, from which it is at once distinguished by the absence of *Leishmania*; (2) ordinary ecthyma, but the initial lesions are not pustular; (3) pyosis tropica, in which the ulcer margins are not undermined; (4) and possibly for blastomycosis, Barkoo rot, syphilis, veldt sore and one or two other affections easily differentiated by their clinical and microscopical characters.

Dr. Castellani recommends an autogenous vaccine as the best treatment.

An excellent photograph of the affection accompanies the paper.

P. S. A.

KAMAKHYA PRASAD LAHIRI. A Case of Impetigo Bullosa.—*Indian Med. Gaz.* 1916. Mar. Vol. 51. No. 3. p. 100.

The author observes that though impetigo contagion is very common in Bengal, impetigo bullosa is comparatively rare. Its special features are the presence of big scabs, a large number of bullae, high fever, and recovery under simple treatment. He records the case of a Hindu gentleman who had blisters and pustules forming large crusts, with a temperature of 104° F. With quinine and sulphate of magnesia internally, and dilute Ung. Hydrarg. Nitr. and Ung. Hydrarg. Ammon. externally he was soon cured.

P. S. A.

ARCE (Julian). Pie musgoso. [Mossy foot.]—*Cronica Med.* Lima. 1916. Jan. Vol. 33. No. 631. pp. 6-20. With 10 figs.

An account of several cases of the condition first described by H. Wolferstan THOMAS as "mossy foot" [see the Manual of CASTELLANI and CHALMERS, Ed. 1913, p. 1602]. The illustrations are very good and typical, but the author does not carry the description of the disease much farther than THOMAS.

J. B. N.

LEPROSY.

HOFFMAN (Frederick L.). **Leprosy as a National and International Problem.**—*Jl. Sociologic Med.* 1916. Apr. Vol. 17. No. 2. [Whole No. 152.] pp. 70-88.

In this lengthy paper the author advances an ably argued plea for the general segregation and isolation of lepers, and especially for the establishment of national leprosaria in the United States of America. The number of cases reported on January 1st, 1912, in the U.S. and dependencies amounted to 146 for the mainland, Hawaii 696, Philippine Islands 2,754, and Porto Rico 28. The Home States most affected were Louisiana 71, California 23, Minnesota 18, and Massachusetts 13. In only 19 states is the disease notifiable. There are only two leper settlements, in Louisiana with 97 patients on record, and at Penikese Island in Buzzard's Bay, Massachusetts, with 15 patients. There is also an institution for lepers in San Francisco. At Molokai the present number of lepers is about 660. "Leprosy in Hawaii is relatively and actually on the decline, "a result," in the author's opinion, "primarily to be attributed to the effective plan of segregation at Molokai." These results "find their parallel in Norway, where "under a policy of effective segregation the leper ratio has been gradually reduced from 191.3 per 100,000 of population in 1856 to 61.9 in 1885, and to 13.5 in 1910." [By "effective" the author cannot mean "complete" or "absolute," for in no country where the segregation or isolation of lepers has been attempted has this ever been possible. In the case of Norway for instance, which is commonly but erroneously quoted as a good instance of "effective segregation," the fact is that not half the lepers are or have ever been completely segregated or properly isolated in that country. The greatest diminution of the leper census began in the year 1869, but it was not until 1877 that even the necessitous lepers were kept from begging and were to some extent domiciled in hospitals or with so-called "isolation" in their own homes. The law was not extended to "non-necessitous" cases until 1885. The decline has not been proportionately greater since then. The probability is that improved sanitation and hygienic conditions and better food have largely influenced the diminution of leprosy in Norway as in other endemic areas.]

One of the strongest points that Dr. Hoffman makes in favour of segregation is this: that in properly organised and well managed settlements such as at Molokai, Louisiana and Penikese Island the unfortunate lepers are far happier than when at large, for once they are found out by the public they are treated, in consequence of the general ignorance and fear of contagion, as pariahs, harried from pillar to post and their lives made miserable.

P. S. A.

McCoy (George W.). **Leprosy as a Major Pestilence.**—*Milit. Surgeon.* 1916. Feb. Vol. 38. No. 2. pp. 169-174.

Dr. McCoy observes that he has more than once seen previous attempts to feign leprosy for the purpose of gaining admission to the Molokai Settlement. He alludes to the terrible conditions described

by TONKIN in Northern Nigeria, where the lepers are "as a vast standing army" living insanitarly, and permitted to mix freely with the healthy population and to engage in all trades and occupations.

The number in the United States is estimated at somewhere around 500, less than half of them being confined in special institutions. "In the northern part of the U.S. the disease displays no tendency to spread, practically all cases being imported from endemic foci." "In Louisiana the majority of the cases are of local origin; one or two cases have developed in California in persons who appear not to have had an opportunity to acquire the disease elsewhere." In Hawaii there are now about 700 in segregation, and the annual crop of new cases is about 50, while in the Philippines there are about 4,000 in isolation with about 800 new cases annually.

In Hawaii, the segregation of lepers costs over 200,000 dollars a year, and in the Philippines the annual expense is greater. In spite of the heavy cost "one must insist on segregation in endemic foci, and at least on sanitary control of cases elsewhere."

P. S. Abraham.

JOHNSTON (John A.). *Leprosy.—Philippine Jl. Sci.* Sect. B. Trop. Med. 1915. Nov. Vol. 10. No. 6. pp. 365-370.

An interesting account of leprosy in the Philippine Islands is given in this paper. The disease appears to have been introduced from Japan whence 150 lepers arrived in 1633, and spread over the islands. In 1902, the Bureau of Health reported an estimate of 10,000. The first leper hospital was established in 1633 by the Franciscan monks. At the time of the American occupation, there were three leper hospitals, in Manila, Cebu and Ambos Camarines, with a total capacity of 400. The establishment of a leper colony was decided upon in 1902, and Culion Island selected. In 1906, 500 lepers were sent there, and at the present time their number is about 3,000. The author discusses the etiology of the disease and the characters of the bacillus, and expresses the view that for its transmission intimate contact is necessary. He admits that even in such conditions "infection is rare"; thus "of 225 healthy natives living in the same house as lepers only 4.5 per cent. acquired leprosy; and among the married, only 9 out of 181 contracted the disease from their leprous wives or husbands, as the case might be."

In reference to the etiological relation of insects to the disease—considering the ubiquity of acid-fast bacilli—doubt is expressed whether the reported positive findings of leprosy bacilli are not errors. At Culion 315 bed bugs were collected; 15 were examined individually and acid-fasts were found in the intestine in only one instance. The remaining bugs were ground up in lots of 50 in sterile salt solution, centrifuged and smears made. Acid-fasts were found four times.

In the absence of clinical signs he regards the presence of acid-fasts in the nasal mucus as of little importance.

P. S. A.

GOMEZ (Enrique). *Posible puerta di entrada de la lepra.* [A Possible Mode of Entry of Leprosy into the System.]—*Repertorio de Medicina y Ciruj.* 1916. Vol. 7. No. 8. pp. 350-352.

Attention is drawn by the author to the fact that in countries where the poorer classes go about barefooted and rarely wash their feet, cracks form in the skin of the heels which may easily be the portal of entry of lepra bacilli into the system. Such is the habit of the poorer classes in Peru, and in the author's experience leprosy shows itself first on the legs and feet, in that country, with remarkable frequency. Many authors insist that the lepra bacillus is excreted from the body in the stools, and in dirty surroundings the result will be that the bacilli will be picked up by dirty bare-footed people. [The author might have added, and especially children.]

He suggests that the reduction in leprosy, seen in many countries, has coincided with the more general habit of wearing boots and stockings.

J. B. Nias.

HOLLMANN (Harry T.). *B. leprae in the Circulating Blood of Lepers.* *U.S. Public Health Bull.* 1916. Jan. No. 75. pp. 15-19.

The author observes that if the bacillus is present in the blood of many cases of leprosy, the fact may play an important part in the study of insect transmission of this disease.

He refers to the observations of DOUTRELEPONT and WOLTERS, MUELLER, KOEBNER, MAJOCCHI and PELLIZARI, all of whom demonstrated acid-fasts in the blood during febrile periods. In the records of 44 investigations on the subject only 13 failed to find the bacillus in the circulating blood.

Employing the methods of CROW and RIVAS, with all precautions against contamination, the author examined the blood from a superficial vein in 22 cases, 17 being nodular. In six of the latter, acid-fast bacilli were demonstrable though in two cases only one bacillus was found. In all but one, bacilli were also present in a scraping of the skin at the site of puncture, though the skin was apparently healthy.

In one nodular female, during a period of new nodule formation with fever, numerous bacilli could be seen by simply making a smear of the blood and staining, but subsequent to this attack none could be found in her blood by any method used.

A full bibliography is appended of work on the subject.

P. S. A.

GOODHUE (William J.) & MCCOY (George W.). *Leprosy in a Nineteen-Months-Old Child.*—*U.S. Public Health Bull.* 1916. Jan. No. 75. pp. 21-22.

Of 1,062 lepers under observation in Hawaii in the last 13 years only eight were under the age of five. The youngest case seen by either of the authors, prior to the one now recorded, was three years old, the child of leprous parents.

Reference is made to the claim of ZAMBACO of having seen congenital cases, and to NAKAYO's case in Japan of a new born infant with typical leprous infiltrations and bacilli, which appears to be the only authentic instance.

In the present case the child, a female, was aged 19 months, the father and mother were lepers of the nerve type, aged 41 and 40 years, and had been in the settlement for 20 and 16 years respectively. They had both had children by former spouses and none of them, as far as known, had developed leprosy.

The child's lesions were leucodermic, non-aesthetic areas on the face and thighs, of doubtful significance, and a reddish-brown raised nodule on the flexor surface of the left forearm. This on microscopical examination showed characteristic leprosy bacilli.

The infant had been removed within six hours of birth to non-leprous surroundings, as is the custom at the settlement and had not since been in contact with lepers.

This is the first child to develop leprosy among about 100 that have been born at Molokai, since the plan was adopted of removing the children at once after birth to non-leprous environment.

P. S. A.

VOTO BERNALES (Juan). *Sobre un caso de lepra.* [A Case of Leprosy.]—*Cronica Med.* Lima. 1916. Apr. Vol. 33. No. 634. pp. 115-116. With 1 fig.

Brief notes of an early case of leprosy, in a youth of 17 years, in which it was impossible to trace the origin of the infection. The lesions consisted of macules on the cheeks and the lobes of the ears, and infiltration of the left ulnar nerve with anaesthesia in the area of its distribution. Bacilli could not be demonstrated in the nasal secretion, but were found in excised portions of skin.

J. B. N.

HORN (J.). *Leprosy of the Upper Respiratory Tract, with Report of a Case.*—*Ann. Otol. Rhinol. & Laryngol.* 1914. Dec. Vol. 23. No. 4. pp. 765-770. With 4 plates.

The author reports the case of a female, aged 27, a native of Kurland, Russia, whose larynx was extensively involved in the disease. She had been nine years in America. Her mother died of leprosy five years ago. Before leaving Russia, she had been treated for some nasal affection, but it was not until six years ago when she presented herself for skin treatment that the diagnosis of leprosy was made.

All attempts at treatment, cauterisations, etc., failed to arrest the extension of the growth in the larynx and pharynx.

Drawings are given of the larynx and pharynx.

P. S. A.

BOWIE (J. T.). *A Case of Leprosy in a Trooper of the 1st (N.Z.) Expeditionary Force (ex Samoa).*—*New Zealand Med. Jl.* 1916. Apr. Vol. 15. No. 66. pp. 41-44; and *Med. Jl. Australia.* 1916. May 20. Vol. 1. 3rd Year. No. 21. pp. 415-416.

A returned trooper from Samoa, aged 28, came to the hospital with a skin disease of 11 months' duration. He was born in Bombay and when 15 years old went to Edinburgh and lived there 7½ years; then came to New Zealand and joined the Expeditionary Force. Two

months after going to Samoa, a swelling appeared on the left foot. Both feet became affected and one ulcerated. He returned to his trade as a plumber, and his affection was supposed to be chronic lead poisoning. On examination the clinical symptoms were those of early leprosy, with thickening of the skin in various regions, and pigmentations and anaesthetic areas. Acid-fast bacilli were found in smears from the nasal mucous membrane and in sections from skin nodules.

In the author's opinion the disease must have been introduced into the patient in India, giving an incubation period of about 12 years.

P. S. A.

ROGERS (Leonard). Preliminary Note on the Use of Gynocardates Orally and Subcutaneously in Leprosy.—*Lancet*. 1916. Feb. 5. pp. 288-290.

For a number of years past the author had employed gynocardic acid and sodium gynocardate internally for leprosy and had observed especially good results in three cases which are here described, the improvement in one case having persisted for two years, and frequent examinations for over a year having failed to show bacilli. Since Dr. HEISER's visit to Calcutta subcutaneous injections of gynocardates instead of oral treatment have been used with rapid improvement in a number of cases.

It appears to be of importance to inject pure gynocardate free from palmitic acid, very little local action—pain or swelling—being then produced. One or two grains up to a maximum of four grains once or twice a week have been administered, but it is probable that considerably larger doses might be given. In the "nerve" cases, marked increase of sensation together with diminution of the nerve thickening has been effected and ulcers have healed, and in several "tubercular" cases the dermal thickenings have diminished and become softer and the bacilli have lost their acid-fast characters.

"Although it is far too early to say what will be the ultimate result of the treatment, I am sure that the improvement which has been effected in a number of cases both of anaesthetic and tubercular leprosy has been far more rapid under the influence of the hypodermic injections of sodium and potassium gynocardates than under any other treatment I have tried, including nastin subcutaneously and chaulmoogra oil and gynocardic acid by the mouth."

Sir Leonard Rogers strongly recommends a careful trial of the method by others, and is hopeful that the less painful injections of gynocardates may ultimately prove to be a more rapid, effective and convenient method of treating the disease. [In 1890 Dr. Z. Roux pointed out that gynocardic acid and gynocardates of soda and magnesia could be obtained from chaulmoogra oil, and were much better borne by leper patients. It was then being used with advantage at the St. Louis hospital. About that time the reviewer also employed them with some benefit in cases in London.]

P. S. A.

ROGERS (Leonard). **Gynocardates in Leprosy.** [Correspondence.]—*Indian Med. Gaz.* 1916. May. Vol. 51. No. 5. p. 195.

Sir Leonard Rogers refers to his article on this subject in the *Lancet* [epitomised above] and as highly coloured accounts of the treatment he is now adopting have appeared, he here shortly gives an account of the method he recommends, and again repudiates any claim to have discovered a cure for the disease, although his experience so far of the effect following the injection of gynocardates in leprosy justifies him in recommending a trial of the method by others. The gynocardates can be given in 2 grain pills after meals, or preferably by subcutaneous injection, "several months being required to produce marked improvement."

P. S. A.

McCoy (George W.) & HOLLMANN (Harry T.). **The Chaulmoogra Oil Treatment of Leprosy.**—*U.S. Public Health Bull.* 1916. Jan. No. 75. pp. 3-10.

The authors review the literature bearing on the treatment of leprosy by chaulmoogra oil, and especially refer to its administration by hypodermic injection. According to DYER, it was first used hypodermically by BLANC of New Orleans in 1888, but with results "that did not appear to justify a continuance of the experiment." It was then so employed by TOUSTOULIS of Cairo, who reported his favourable results in 1899. CASTEL used it in 5 gram doses subcutaneously, and called attention to the danger of fatty embolism, which occurred in two of his cases. Many other observers have tried the method and more recently HEISER in the Philippines.

In Hawaii chaulmoogra oil has been the most popular remedy since 1886—many cases have benefited. The hypodermic use of the oil has been tried by the authors in 42 cases, 16 of which have received injections for periods of 10 to 17 months. Of these, 10 are "improved," four are "stationary," and two are "progressive." The majority have been also taking the oil by the mouth and a number of them have had carbon dioxide snow applied to the lesions. One case "has improved to such a degree as to make it impossible to find acid-fast bacilli in the smears from lesions."

A weekly injection was given of 5 cc. of a mixture containing 50 per cent. of oil, according to the formula of JEANSELME [*La Presse Medicale*, 1911] and MERCADO's used by HEISER [*Report of Bureau of Health*, Philippines, 1914]. Unfavourable complications, abscesses, fainting, coughing, sometimes occur.

The authors' experience agrees with the conclusions of most observers that the oil is helpful in many cases of leprosy, and that the hypodermic method though not free from complications, has given good results, and is worthy of further trial. They are sure, however, "that the use of chaulmoogra oil as at present practised is not the solution of the problem of the therapeutics of leprosy."

P. S. A.

VAHRAM (M.). *Le traitement de la lèpre par les injections intra-veineuses d'huile de chaulmoogra.*—*Progrès Méd.* 1916. Feb. 5. No. 3. pp. 19-20. With 1 text-figs.

After many attempts, the author has succeeded in preparing a "pseudo-colloidal" emulsion of chaulmoogra oil with gum arabic suitable for intravenous injection. The toxic dose tested on rabbits and dogs was 0.004 per kilogram of animal; the therapeutic doses employed in the human subjects were, in proportion, 20 times weaker.

Two cases of M. BROCC's were placed under treatment. One presented open lesions with complete insensibility and numerous nodules, had been diseased for 20 years, and had been treated in various ways without much effect; the other had pigmented patches and anaesthetic areas for eight years, and had also been treated with chaulmoogra oil internally with but little benefit.

Each patient received about 30 intravenous injections, no reactions or deleterious effects have been produced, and the curative results have been very remarkable. The open lesions have healed and complete sensation restored; in one case amelioration commencing after the eighth injection.

The author recommends the first injection to be 1/4 cc., progressively increased by 1/10 cc. until 2 cc. have been given, and after the 20th intravenous injection others may be given subcutaneously. Both intravenous and subcutaneous injections may be administered every second day. This new method of giving chaulmoogra oil is particularly notable in view of the small doses required to obtain rapid and obvious results without the inconvenience and disagreeable effects generally produced by its administration in other ways. It certainly deserves an extended trial.

P. S. A.

McCoy (George W.) & HOLLMAN (Harry T.). *Carbon Dioxide Snow in the Treatment of Leprosy.*—*U.S. Public Health Bull.* 1916. Jan. No. 75. pp. 11-13.

The local use of cold in cancer led LIE in 1904 to apply ethyl chloride and anesthetic to leprosy lesions. WAYSON in Honolulu first used solid carbonic dioxide about five years ago.

The authors have treated 31 cases, 27 being nodular, three of them mixed and one of the anaesthetic type. One case with small indurations has had the snow over a period of nearly three years, and has shown the most marked improvement—indurations have been absorbed leaving pigmented areas. All diseased areas have been treated and have been bacteriologically negative for about six months. This case also received chaulmoogra oil by mouth and by injection.

Seventeen of the cases treated showed diminution in the size of the lesions but all remained microscopically positive; 10 showed no improvement. "Probably the beneficial action is due to the inflammatory reaction set up."

P. S. A.

DENNEY (Oswald E.). **The Treatment of the Retrogressive Skin Lesions of Leprosy with Basic Fuchsin.**—*Philippine Jl. Sci. Sect. B. Trop. Med.* 1915. Nov. Vol. 10. No. 6. pp. 357-363. With 3 plates.

In view of MAY and HEIDINGSFELD's successful results with basic fuchsin in chronic ulcers, the author tried it in 132 patients selected from the Culion Leper Colony, as a germicide and epithelial and granulation tissue stimulant. Cotton pledgets soaked in 1 in 1,000 aqueous solution of basic fuchsin were packed into the lesions and kept in place by bandages.

Ulcerated nodules responded rather slowly. One case in four was eventually healed and another showed considerable improvement. Neuropathic ulcers which had long resisted other treatment quickly improved; 15 out of 33 cases healed completely and only three did not improve. Of six cases of infected neuropathic ulcers four continued to complete repair. Four simple and infected burns all did well. Fifty-three cases of perforating ulcers were treated, 12 were completely repaired and 31 improved. The treatment was also successful in many cases of gangrene.

The paper is illustrated by three plates of photographs.

P. S. A.

MARCHOUX (E.). **Transmission de la lèpre par les mouches (*Musca domestica*).**—*Ann. Inst. Pasteur.* 1916. Feb. Vol. 30. No. 2. pp. 61-68.

The author refers to the various observations previously recorded on this subject, and especially to the experiments of WHERRY, CURRIE and LEBOEUF, who all found the bacilli in the intestines or dejecta of flies which had fed upon leprosy ulcers, etc., and surmised that by means of flies leprosy may be communicated. As the bacillus of human leprosy is not inoculable in animals, this hypothesis could not be experimentally verified.

The author therefore experimented with rat leprosy, which can be inoculated in healthy rats.

Flies were fed upon crushed leprous nodules and kept in a receptacle with white rats, which are very sensitive to the disease, and which had wounds or pieces of skin cut from their backs.

Numerous observations carried over many months and control experiments showed (1) that the flies conveyed the bacilli of rat leprosy on their feet and bodies; (2) that the bacilli will not live in the intestine of flies; (3) that there is not an emission of excrement every time a fly feeds; (4) that infection only takes place in the immediate neighbourhood of the diseased rat, because the bacilli carried by the fly are quickly dried and rendered inert.

P. S. A.

CLEGG (Moses T.). **The Cultivation of a Nonchromogenic Acid-fast Bacillus from a Case of Nodular Leprosy.**—*U.S. Public Health Bull.* 1916. Jan. No. 75. pp. 23-25.

Small particles of a nodule containing a large number of acid-fast bacilli were inoculated in 20 tubes of media growing amoebae and *B. cholerae* and incubated at 37° C. for two weeks. Four of the tubes

showed enormous increase of "acid-fast bacteria." Control tubes, but without the amoeba-cholera combination, showed no increase of lepra bacilli in the same time. After transplanting once a week in amoeba-cholera cultures for six weeks, the acid-fasts were obtained in pure culture by heating at 60° C. for half an hour, so killing the vibrios and amoebae. The acid-fasts grew readily alone when transplanted. They were small rod-shaped organisms, with tendency to lie in bundles. They produced no chromogen, but otherwise resembled other cultures isolated from lepers. Smears stained faintly with ordinary basic stains, and smears from young cultures did not lose the carbolfuchsin stain when treated with Gabbett's solution, or after washing for three minutes in absolute alcohol. The growth on glycerine agar was abundant after the sixth day and no pigment was produced; the colour resembled that of tubercle bacilli on similar media.

A guinea-pig inoculated in the thoracic region from a 24 hour culture died three months later. The only gross lesions were congestion of the kidneys, and a small nodule in the left fore-leg showing a large number of acid-fast bacilli, singly and in masses, similar to those found in nodules from lepers. There were no enlargements of glands or other evidence of tuberculosis. Other guinea-pigs inoculated from this nodule, remained free from tubercle.

P. S. A.

McCoy (George W.) A Note concerning the Favorable Influence of Glucose on the Growth of Acid Fasts.—*U.S. Public Health Bull.* 1916. Jan. No. 75. pp. 27-31.

It being observed that an acid-fast culture isolated from a leprous nodule by means of symbiotic growth, grew luxuriantly on agar containing grape sugar, repeated experiments were made to determine the amount of carbohydrate required to influence several other slow-growing acid-fasts. Even one in 1,000 had a favourable effect, but one per cent. was most efficacious, especially in solid media. Experiments with other sugars were made, and they showed that glucose and laevulose had the best influence.

The details are given in a number of tables.

P. S. A.

HARRIS (Wm. H.) & LANFORD (John A.) The Agglutination Reaction with Sera derived from Human Cases of Leprosy and from the Experimental Animal upon Various Members of the Acid-fast Group.—*Jl. Med. Res.* 1916. May. Vol. 34. No. 2. [N. Ser. Vol. 29]. Whole No. 156. pp. 157-167. With 1 fig.

In the course of experiments on the cultivation of *B. leprae*, the authors have attempted to differentiate and identify the various acid-fasts isolated by the different workers, and among other biological methods have tried to find specific agglutinins for such organisms. The sera tested were obtained from 20 cases of different types of leprosy at the Louisiana Leper Home, and also from rabbits in which different intensive efforts were made to produce immune substances.

The strains of CLEGG, CURRIE, BRINKERHOFF, BAYON and DUVAL were employed, as well as three types of tubercle bacillus—human,

bovine and avian, *B. phlei*, dung strains of MOELLER, and acid-fast cultures of KORN and KARLINSKI. An emulsion of Hansen bacilli from a human nodule was also used.

The difficulty of preparing a suspension wherein the bacilli could be properly separated was met by a device described and figured.

Copious details and tables relating to their observations are given with full references to the work of other observers.

The authors say that "the various methods employed in these experiments with acid-fast micro-organisms seem to be of little avail in developing or utilising the agglutinins for distinct differentiation or for identification purposes."

The conclusions arrived at are :—

"(1) The agglutinin present in the sera of the human subject affected with leprosy is usually low in titer and inconstant in its action.

"(2) The employment of this procedure, therefore, has proved of no avail in serving to authenticate any of the various cultures isolated from the leprosy lesion of the human as the human bacillus.

"(3) The sera derived from rabbits inoculated with various bacillary antigens yield agglutinins likewise inconstant in amount and erratic in their action.

"(4) Sera derived from these inoculated animals do not serve to differentiate the various species employed in these experiments but suggest a group relationship.

"(5) Until some further refinement in these procedures is devised but little reliability can be placed upon this type of test as a means of identification of any culture isolated from the lesion of leprosy as the bacillus of Hansen."

P. S. A.

SUDHOFF (K.). Einige Dokumente zur Geschichte der Lepraprophylaxe in Süditalien in der 2. Hälfte des 13. Jahrhunderts. [Documents on the History of Leprosy Prevention in Southern Italy, in the second half of the thirteenth century.]—*Arch. f. Gesch. d. Med.* 1915. Aug. Vol. 8. No. 6. pp. 424-429.

The author has investigated ancient documents in the archives of Naples which refer to more stringent measures being adopted in the 13th century for the separation and seclusion of lepers and their belongings from the healthy community, as it had been found difficult to keep them in the asylums.

The various orders bearing on the subject in Latin are quoted in this paper. It would appear that there was considerable opposition to these orders and that many lepers were found to be at large. The municipalities in some cases contributed to the support of the establishments, which were not numerous in South Italy, although this was not compulsory. The State defrayed the expenses of the few cases which they sent to the institutions.

P. S. A.

PLAGUE.

CREEL (R. H.). The Extension of Plague Infection of the Bubonic Type.—*Amer. Jl. Pub. Health.* 1916. Mar. Vol. 6. No. 3. pp. 191-221. With 4 maps.

The writer criticises the conclusions arrived at by the Indian Plague Commission with regard to the spread of plague infection by means of plague infected fleas, carried about on the clothing of persons who may not themselves be suffering from infection. He considers that the evidence adduced by the Commission in support of their contention that plague was introduced into Sien, Wadhali, Parel and Warli villages from Bombay by clothing containing infected fleas may be rejected as being unconvincing, and believes that the Indian workers attributed too much importance to coincidence and did not sufficiently consider the factor of rat migration or transportation in merchandise.

Creel's paper contains an analysis of the cases of human plague which occurred in San Juan, Porto Rico in 1912, Havanna, Cuba in 1914, and in New Orleans 1914-1915. In the Porto Rico cases, on every occasion the possibility of direct infection from rodent sources was clearly manifest and the unlikelihood of infection from human sources was equally apparent. With regard to the intra-urban spread of the disease the infection adhered to the railroad, despite the fact that a very large proportion of the travel out of San Juan is across country. The eradication campaign (as in the case of San Francisco in 1907-8) was based on the assumption that the intra-urban extension of infection was brought about by migratory rodents, and very little weight was given to the efficacy of fumigation of the habitation of human cases as an eradicated measure. "If the eradication results are any index, then the argument of rodent migration versus flea transportation is strongly in favour of the former."

The general conclusions arrived at by the writer are summarised as follows:—

"1. Diffusion of plague infection within a city results, chiefly if not entirely, from migration of infected rodents.

"2. The transmission of plague by flea-infested clothing from a human case is a remote contingency.

"3. The possibility of transmission of infection by loose fleas in merchandise is evident, but improbable because the habitat of plague-carrying fleas is in and about the burrows of rodents and on their bodies, and when temporarily separated therefrom the natural tendency of these parasites is to regain such habitat.

"4. The travel of infection from one community to another is generally accomplished by infected rodents transported in merchandise.

"If such conclusion be correct, the eradication of plague is chiefly dependent upon reduction or relative destruction of the rodent population by the various means employed, as trapping and poisoning, aided and supplemented by rat-proofing, without any considerable attention to human plague incidence or to the movement of the travelling public.

"The extension of infection into clean territory can be reasonably prevented by supervision of outbound shipping, deratization of ships (fumigation), rat-proofing of railroad cars, inspection of cargo, requiring it to be from rat-proof wharves or warehouses; or subject to inspection to insure its being rat-free, or fumigated if need be. To these measures additional safety can be secured by restrictions as to loading—ships to be fended off from docks with rat guards on all communicating lines, or to load at anchor by means of lighters, and railroad cars to be permitted to load only during daylight, closed at night if only partially loaded and to receive freight only from rat-proof buildings."

R. St. J. Brooks.

CREELE (R. H.). **The Prevalence of Bubonic Plague and Its Control.**—*Milit. Surgeon.* 1916. Mar. Vol. 38. No. 3. pp. 269–280.

The grave error of anti-plague work has always been the adoption of an eradication standard based on the status of the human instead of the rodent case incidence, the reason for the misleading standard being due to the fact that the occurrence of human plague is readily apparent, while the status of rodent plague can only be ascertained by a long continued and vigorously sustained campaign against the rat population. Sanitary effort should be concentrated on the problem of the best methods for bringing about a reduction of the rodent population, the writer being of opinion that if the latter can be sufficiently reduced (from 50 per cent. to 80 per cent. of the usual number), and congested rats centres eliminated so that the remaining rats are well scattered, plague will disappear without any pulicidal measures having to be adopted.

In dealing with outbreaks of human and rat plague, the following scheme, based on the experience of the United States Public Health Service may be adopted :—

General measures	Survey	(a) Plague laboratory	{ Examination of rodents. Examination of human plague suspects.
		(b) Delineation of infected area	{ Rodent examination. Epidemiology of human cases. “ Sentinel ” guinea-pigs.
	Eradicative	Rodent destruction	{ Trapping. Poisoning. Miscellaneous.
		Rat-proofing	{ Protection of food supply. Elimination of harborage.
	Restrictive	Fumigation SO_2 , CO, HCN	{ Ships. Cargo or R.R. freight. Baggage.
		Rat-proofing	{ R.R. cars. R.R. stations and freight warehouses.
Special measures (Applied to foci)		Evacuation	
		Intensive rodent destruction	{ Fumigation HCNSO_2 . Immediate removal of harborage.
		Flea destruction	{ Fumigation. Coal oil emulsion. General cleanliness. Attention to household pets (cats and dogs).

VÉCSEI (Ferdinand). *Beitrag zur Epidemiologie der Pest. (Die Pest in Schanghai.)* [Contribution to the Epidemiology of Plague. (Plague in Shanghai).]—*Wien. Klin. Woch.* 1915. Dec. 30. Vol. 28. No. 52. pp. 1445-1446. With 2 maps.

In this paper an account is given of the plague incidence and methods of eradication adopted in Shanghai during the years 1908-1912. The infection was conveyed from South China in 1908 by means of ship's rats, the first plague infected rodent being found at the docks situated in the eastern quarter of the town. In spite of energetic sanitary measures the disease soon spread to the Chinese quarter, Chapei, and during the succeeding year (1909) the greatest number of infected rats were found in the Chapei neighbourhood, and in the adjacent northern district. In this district of the European settlement the first case of human plague occurred. The following table shows the incidence and distribution of rat infections throughout the period in question :—

Year.	Number of dead rats found.	Number of plague infected rats found.					Number of rats trapped and poisoned.
		E.	N.	S.	W.	Total.	
1908							
8 to 31							
Dec. ..	1,329	33	11	5	0	49	2,209
1909 ..	17,364	81	59	42	5	187	91,833
1910 ..	19,559	9	200	30	10	249	216,879
1911 ..	14,929	0	118	10	10	138	177,048
1912 ..	11,988	5	62	26	2	95	154,005

The methods of combating the infection are summarised as follows :—

" 1. The dead rats were sent to the Laboratory daily, in order to determine the locality, and spread of the infection.

" 2. In order to deprive the rats of their nourishment, the daily house refuse was made inaccessible to the rats, through the employment of cemented, closely-covered containers. This was quickly accomplished.

" 3. The houses were rendered rat-proof in two different ways :—

" (a) 'Temporary,' through cleansing, disinfection, removal of fleas, repairs of gross delapidations.

" (b) 'Permanent' through rebuilding.

" 4. Rat destruction through poison, etc.

" 5. Vaccination."

R. St. J. B.

de RAADT (O. L. E.). *Contribution to the Knowledge of the Epidemiology of the Plague in Java.* [Also in Dutch.]—*Mededeelingen van den Burgerlijken Geneesk. Dienst in Nederl. Indië.* 1915. Vol. 4. pp. 20-38. With 3 plates & 1 fig.

The species of fleas on Javanese rats are of some importance in the determination of the locality from which the animals are derived.

Out of 2,499 house rats caught in-doors, the "flea index"—i.e., the average number of fleas per rat, for *Xenopsylla cheopis* was 0.96 and for *Pygiopsylla ahalae* 0.2, while out of 526 field rats caught in the fields, the indices were 0.12 and 0.03 respectively, and out of 823 house rats caught in the fields the indices were 0.42 and 0.07 respectively (VAN LOGHEM). From investigations by the author in the coffee plantations in September and October 1913, on 382 rats (of which 84 per cent. were house rats), the flea index for *Xenopsylla cheopis* was 0.01 and for *Pygiopsylla ahalae* 0.64, while on 147 rats (of which 93 per cent. were house rats), caught in the houses during the same period the indices were 0.59 and 0.34 respectively. It thus appears that *Xenopsylla cheopis* is most prevalent on rats caught indoors, much less so on rats caught in the fields and nearly entirely absent from rats taken from the coffee plantations, while *Pygiopsylla ahalae* is most prevalent on rats from the coffee plantations, much less so on rats in the houses and least of all on rats from the fields. It would seem therefore that the necessary conditions for the development of *Xenopsylla cheopis* are solely to be found indoors and that this flea may to a certain extent be called a house flea. Its appearance on rats taken in the fields and in the coffee plantations can only be explained by its transportation from the house by means of house and field rats. The conditions for the development of *Pygiopsylla ahalae*, on the other hand, are most favourable in the coffee plantations and in the woods. Whether these conditions are also present indoors is doubtful, the probability being that this flea is introduced afresh by the rats which live in the coffee plantations.

With regard to the emigration of rats from village to village and its relation to the spread of plague, an attempt was made in November 1911 to ascertain the source of rat migration by means of "proof houses," the idea being that if the rat emigrated because it had no suitable place in which to nest, it would avail itself of the very first opportunity to live undisturbed. Five houses were erected and placed at various distances from some villages. At the end of a week one of the houses was occupied by a house rat, which must have travelled at least 230 metres from the nearest village. An easier method of research was adopted later, i.e., by digging up rats living in underground holes. Working in this way, a not inconsiderable number of house rats were included in the catch. Five house rats (6.7 per cent.) among 74 rats were caught in the open fields, the average distance to the nearest village being more than 200 metres. That these five rats were not house rats habitually living out of doors, was shown by the fact that the fleas with which they were infested were *Xenopsylla cheopis*; the animals must therefore have very recently have left the dwelling house. A year and a half later the investigation was continued, the excavations taking place at an average distance of 600 metres from the nearest village. From 5 to 9.6 per cent. of the rats caught in the rice fields from the middle of May to the end of July were house rats; the rest were field rats. Further it was made clear that the Cheopis index of these house rats was 0.44, while the indices of the house rats caught in the villages and of the field rats were 1.15 and 0.15 respectively, the conclusion again being that these house rats caught in the fields did not belong to the indigenous inhabitants of these fields but must have emigrated from the houses.

de RAADT (O. L. E.). Can the Plague be spread by Head-Lice?
[Also in Dutch.]—*Mededeelingen van den Burgerlijken Geneesk.
Dienst in Nederl-Indië*. 1915. Vol. 4. pp. 39-40.

SWELLENGREBEL has shown that *Pediculus vestimenti* is capable of transmitting plague infection [see this *Bulletin*, Vol. 5, p. 24]. The following experiments devised by De Raadt indicate the possibility of the disease being also spread through the agency of the head louse, *Pediculus capitis*.

"The head-lice were obtained by combing the luxuriant hair of a female plague patient; these parasites were afterwards rubbed fine in a mortar with physiological salt-solution, and with this mixture rodents were inoculated both subcutaneously and cutaneously. By collecting the head-lice exclusively from the corpses of plague patients and not from living patients, the chances for positive results were made as great as possible, because in cases of bubonic plague, an intense bacteriaemia generally develops in the later stages of the disease.

"Altogether five inoculation experiments were made, of which a short review is given below :—

Rodent I. Subcutaneous inoculation.

On 23/4/13 with 10 headlice.

„ 25/4/13 „ 32 „

„ 28/4/13 died of plague.

Rodent II. Cutaneous inoculation.

On 24/4/13 with 10 headlice.

„ 26/4/13 „ 7 „

„ 28/4/13 „ 8 „

„ 4/5/13 died of plague.

Rodent III. Subcutaneous inoculation.

On 30/4/13 with 7 headlice.

„ 3/5/13 „ 9 „

„ 6/5/13 died of plague.

Rodent IV. Cutaneous inoculation.

On 5/5/13 with 27 headlice.

„ 9/5/13 died of plague.

Rodent V. Subcutaneous inoculation.

On 6/5/13 with 15 headlice.

„ 8/5/13 „ 8 „

„ 9/5/13 „ 40 „

„ 12/5/13 died of plague.

"Result: Of five inoculation experiments, 100 per cent. were positive.

"This proves that head-lice which have sucked the blood of plague-patients, have absorbed the plague virus, and must consequently be considered capable of transmitting the disease from one person to another."

R. St. J. B.

de RAADT (O. L. E.). **The Loss of Fleas from the Living Rat.** [Also in Dutch.]—*Mededeelingen van den Burgerlijken Geneesk. Dienst in Nederl.-Indië*. 1915. Vol. 4. pp. 17-19.

These researches were made with the view of ascertaining the loss of fleas from rats in normal circumstances and as to whether the fleas, which are in such circumstances "deprived of their food," are sufficiently numerous to be likely to infect human beings with bubonic plague. Five rats, which had been freed from fleas were taken, and on each of these rats twenty fleas were let loose. The fleas had previously undergone partial starvation. Subsequently each rat was placed in a trap, and the traps were suspended at a height of 1·5 metres from the ground. Towards evening the rats were removed to a second series of traps which were hung in the same manner as the first series, but at a considerable distance from them. The rats were kept in the second series of traps till the following morning, after which they were taken back to their original traps. In this manner the running away of the rat out of its nest was imitated. Only 16 (20 per cent.) of the original total of 80 fleas were recovered, that is to say, in less than 48 hours 80 per cent. of the fleas had disappeared from the fur of the rats. In a control series, in which the rats were not removed but placed at the uninterrupted disposal of the fleas, only 37 per cent. of the fleas disappeared. A second series of experiments gave similar results; in the intermittent experiment 76 per cent. of the fleas disappeared while in the uninterrupted control only 38 per cent. of the fleas were missing at the end of the experiment. That the loss of fleas was really due to the migration of the rats could easily be proved by the presence of the insects in the rat traps and also on the floor beneath the traps and in the fur of rodents placed under the traps.

"From these experiments it therefore appears that when the rats are not continually in the immediate neighbourhood of the fleas (scarcity of rats) the total loss of fleas from living rats is considerably greater (38-43 per cent. of the total number of fleas) than in those cases where the host remains continually within reach of the fleas.

"This fact must be considered of importance when investigating the possibility of human beings becoming infected with bubonic plague by *live* rats which have only temporarily remained in the neighbourhood of man."

R. St. J. B.

de SOUZA, Jun. (Antonio). **Quelques considérations sur la peste humaine.**—*Bull. Soc. Portugaise des Sci. Nat.* 1913. Vol. 6. No. 3. pp. 119-123; 127-138.

As the result of his experience with plague in Portugal, de Souza has come to the conclusion that primary septicaemic plague has no real existence; furthermore even in such cases as he describes as "*petite adenite pesteuse humaine*" a meticulous examination shows that one or several of the lymphatic glands present lesions corresponding to those of a primary bubo. Primary tonsillar plague is, in the author's experience, very rare and is only carried by contagion from person to person, the origin of infection being another individual suffering from tonsillar or pneumatic plague. Tonsillar plague can also be derived from a primary cervical bubo by direct lymphatic contiguity, or by means of a blood stream infection.

He has had reason to change the view he held formerly, in common with WILM and others, regarding the occurrence of primary intestinal plague. He now appears to be in entire agreement with the Advisory Committee for Plague Investigation in India, and does not consider that there is any unequivocal evidence of the existence of primary intestinal plague in man.

"I have sometimes observed in murine epizootics in the Island of Terceira, the anomaly of primary retroperitoneal buboes. . . . I have never observed mesenteric buboes among the island rats, but on the contrary I have seen retroperitoneal buboes, without relation to the intestine. I am at one with the Advisory Committee, in that the rat is not infected spontaneously by means of the digestive tube." R. St. J. B.

di MATTEI (Eugenio). *L'episodio di peste dell' autunno del 1914 in Catania*. [The Occurrence of Plague in Catania in the Autumn of 1914.]—*Malaria e Malat. d. Paesi Caldi*. 1916. May–June. Vol. 7. No. 3. pp. 160–191. With a map.

This is an account of a small outbreak of plague which occurred in Catania in the autumn of the year 1914. The disease was probably introduced from Libia by means of infected ship's rats, as cases first appeared in the vicinity of the customs house, which is described as being dirty and unhygienic. On subsequent investigation, large numbers of dead rats were found in the custom house buildings and along the docks. In all nineteen cases of human plague occurred. Of these 14 were males, with a mortality of 64·3 per cent., and five females with a hundred per cent. mortality. In the first group, one case was carbuncular (one death), nine were bubonic (four deaths), and four septicaemic (four deaths); in the second group two were bubonic and the remaining three, septicaemic. R. St. J. B.

RAGAZZI (Carlo). *Sul significato di alcuni casi di peste a decorso anomalo*. [The Significance of Some Cases of Plague of an Anomalous Course.]—*Pathologica*. 1916. May 15. Vol. 8. No. 181. pp. 159–162.

An account is here given of five cases of atypical plague which occurred during the plague epidemic in Bengazi in 1914–1915. One case, which occurred in a European, resembled in some respects Pestis minor and in others ambulatory plague. On admission the patient's temperature was about 38° C. He suffered from headache and pain in the right side; his general condition was satisfactory. A soft infiltrated swelling was observed on the right side in the nipple line at the sixth intercostal space. The overlying skin was reddened but not adherent and lymphangitis was not present. The swelling was aspirated and a drop of blood-stained serum obtained for examination. The fluid was positive for *B. pestis*, both by direct examination and by culture, such cultures being of full virulence. The fever subsided by lysis in three days and in eight days more the swelling disappeared without suppuration. The other cases showed an unusual condition, in that a marked degree of oedema was present. One case gave a picture of axillary adenitis accompanied by a vast serous oedema on the left side of the thorax. There was moderate fever and the patient was up and about till the last phase of his illness. He died suddenly on the 5th day without any change in the local conditions. Examination of the serous exudate was positive for *B. pestis*.

R. St. J. B.

CONNOR (F. Powell). **Eusol and Plague. A Suggestion.** [Correspondence].—*Indian Med. Gaz.* 1916. Feb. Vol. 51. No. 2. p. 73

The author has already drawn attention to the value of intravenous injections of Tinct. Iodi in the treatment of plague. By experimenting on dogs, however, he has found that Tinct. Iodi thus inoculated caused a great deal of irritation, unless given in very small doses. Eusol, which has been used successfully in cases of septicaemia, is extremely well tolerated by the blood and tissues, and the suggestion is here thrown out that the subcutaneous injection of eusol might be used with advantage in the treatment of plague patients. R. St. J. B.

GENEESKUNDIG TIJDSCHRIFT VOOR NEDERLANDSCH-INDIË. (Bijblad van het). Vol. 55. No. 2. pp. 1-90.—**Dienst der Pestbestrijding verslag over het Tweede Kwartaal 1915.** [Report of the Plague Eradication Service for the Second Quarter of 1915.]

These reports contain the observations of the Java Plague Eradication Service on the incidence and methods of combating plague during the second quarter of the year 1915. The matters dealt with, which are for the most part of purely local interest, include reports on the work of the Investigation and Clinical Service, the Disinfecting Service and the Transport and Building Services. During the period under consideration, 673 cases of plague occurred of which 143 were of pneumonic plague. The figures for the corresponding quarter of the four previous years were 1,328 (35 pneumonic cases), 291 (two pneumonic cases), 2,023 (five pneumonic cases), and 3,843 (193 pneumonic cases), so that although the incidence of the disease was considerably less than in the years 1911, 1912 and 1913, the proportion of pneumonic cases to total cases was higher in 1915 than in any of the previous years.

The work of the disinfection service was of a very onerous character and included the treatment of 886 wagons laden with rice, dried fish, skins, cassava, copra, etc., with sulphur dioxide gas. A considerable amount of rat-proofing and demolition of building was also carried out; in the latter connexion especial attention being paid to the proofing of the eaves, floors, dead spaces between walls, wainscots, hollow bamboo structures and fire-places.

An interesting report by VAN LOON is given on a small epidemic of pneumonic plague which broke out in Beereug in April-May 1915. Seven patients died and the remaining six apparently recovered.

R. St. J. B.

FLU (P. C.). **Eenige opmerkingen naar aanleiding van het 1^e kwartaal-verslag 1915 van den dienst der Pestbestrijding.** [Some Observations relative to the Report of the Plague Eradication Service for the 1st Quarter of 1915].—*Geneesk. Tijdschr. v. Nederl.-Indië.* 1916. Vol. 56. pp. 196-222. With a map.

In this communication the author criticises some of the conclusions arrived at by the Java Plague Eradication Service in the early part of 1915. He is of opinion that the efficacy of proper methods of disinfection had not been sufficiently taken into account, and while fully admitting the great utility of demolition, rat-proofing of buildings and so forth, he insists upon the primary importance of sulphur dioxide or hydrocyanic gas disinfection, carried out under skilled supervision.

The methods suggested are essentially those advocated in a previous communication [see this *Bulletin*, Vol. 5, p. 400], in which the covering over of the building required to be disinfected, with a sail impregnated with impervious material was first suggested. The sulphur fumigation should be continued for three hours when even the fleas hidden in the hollow bamboo frame work of the house will be found dead. Some times, however, fleas which are on the ground may escape the action of the sulphur dioxide gas, and it is therefore useful to swab the floor with an antiseptic, such as "phenico," or cleanse it thoroughly with carbolic or formalin soap. If hydrocyanic gas be used instead of sulphur dioxide, the walls, floors, etc., must be washed afterwards with a disinfectant.

Bad results in disinfection work are due to (a) indifferent disinfection carried out by unskilled or improperly supervised workmen; (b) the use of crude or "grey" sulphur, which burns slowly and badly and does not generate sufficient gas on combustion; (c) too short a time taken for the complete disinfection of premises. R. St. J. B.

KITANO (Toyojiro). The Employment of Rat Poison as a Measure for Preventing and Exterminating the Plague.—*Amer. Jl. Trop. Dis. & Prevent. Med.* 1916. June. Vol. 3. No. 12. pp. 627-659.

The employment of rat poison in Japan as a means of combating plague seems in the past to have been attended with indifferent results. This is attributed to the use of improperly prepared poison, to indifferent methods of distribution and to the use of insufficient quantities.

From the author's experiments he has come to the conclusion that the use of phosphorus in the preparation of rat poison is the most effective, and after this arsenic; sulphnal and calcium sulphate, on the other hand, have not proved effective in his hands. In one series of experiments, mice and rats were placed in separate boxes, containing (a) sulphnal, barley and flour mixture; (b) sulphnal, buckwheat and flour; (c) calcium sulphate and flour; (d) arsenic mixture with rice; (e) arsenic mixture with wheat flour; and (f) phosphorus soaked in bread. 27.2 per cent. of the rats experimented with took the arsenic poison, 72.7 per cent. took the phosphorus, while not one of them took either of the other two poisons. With regard to mice, 33.3 per cent. took the arsenic compound and 37.2 per cent. took the phosphorus compound; 7.8 per cent. died of sulphnal poisoning and 1.9 per cent. from the effects of the calcium sulphate. To obtain the best results large quantities of poisoned bait should be used. During the plague epidemic in Kanagawa-ken in 1913-1914 the author enforced the distribution of rat poison in large quantities, as many as fifty pieces to each house, thirty being arsenic and twenty phosphorus, the former being placed in the ceiling under the roofs and the latter under the floors of the ground stories. The poison was allowed to remain *in situ* for twenty days; after this period the poison started to deteriorate. In all, four million pieces of rat poison were distributed among the 80,000 houses in the city, and this was repeated thirteen times. Only three cases of poisoning occurred among human beings, one being a case of suicide and the other two children who mistook it for some kind of cake. These methods of intensive rat poisoning appear to have been very

effective in Yokohama. During the five years ending 1913, a yearly average of 280,000 rats were bought up by the municipal authorities. In 1914, though the price was raised and prizes were offered, the number brought in amounted to but 130,000, which shows that the rats had greatly decreased in the city, and proves that the employment of rat poison for their extermination is a more effective measure than other methods hitherto resorted to.

Method of preparing phosphorus poison :—

Place the phosphorus in a double boiler containing sesame oil, keep at a temperature of 44°C ., and stir the contents well until all the phosphorus is melted. Then stir in flour, being careful to keep up the temperature. If the compound gets too thick add more oil. Keep stirring, being careful to avoid the formation of lumps, until it is just of a fit consistency to spread on bread. The bread is cut into pieces, placed in an earthenware bowl and the phosphorus compound poured on. The whole is then stirred round, so that the poison adheres evenly to every piece of bread. It is then transferred to a wooden vessel containing flour, with which it is covered.

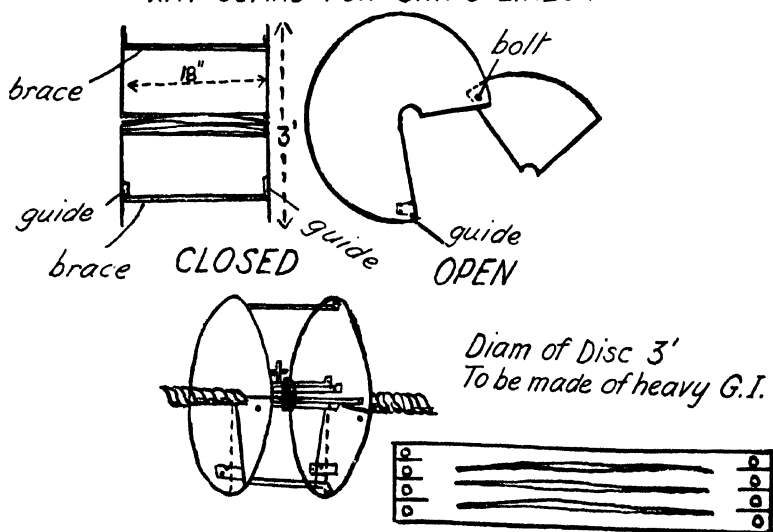
R. St. J. B.

MANNING (H. M.). Design of an Improved Rat Guard.—*U.S. Public Health Rep.* 1916. Apr. 7. Vol. 31. No. 14. p. 880.

"This rat guard is made of two disks of galvanized iron 3 feet or more in diameter, joined by four rods or braces of galvanized iron and a funnel made of sheet galvanized iron.

"Each disk is made up of two segments as shown in the diagram, or the disks can be cut as in the Fox rat guard, and joined on one side by a bolt that acts as a hinge, a socket being provided to lock the two segments on the other side. The two disks are joined at the centre by a funnel made of sheet iron. The funnel is made up of two halves, one of which joins on the one side the two large segments of the disks and on the other the smaller segments. The central part of the funnel has long segments cut out as shown in the diagram.

RAT GUARD FOR SHIPS LINES :



Sheet G.I. cut for $\frac{1}{2}$ of funnel to line

"After closing the guard over a ship's line, the central part of the funnel is tied to the line by a small piece of rope. This fastens the rat guard to the ship's line so that it cannot slip and completely closes the funnel and locks the two halves of the rat guard.

"The advantage of this rat guard is that it is always at right angles to the ship's line, and it would take considerable force to deform it or to flatten it out so that a rat could easily get over it. Also this guard is easily stored away without any danger of damaging it."

R. St. J. B.

PIERCE (C. E.) & CLEGG (M. T.). **Strychnine Sulphate. Its Effect on Californian Valley Quail.**—*U.S. Public Health Rep.* 1915. Dec. 10. Vol. 30. No. 50. pp. 3601-3604.

One of the best methods in use for the destruction of the Californian ground squirrel (*Citellus beecheyi*) is the application of poisoned barley over the infected land during the dry season. Squirrels take to this grain readily, while birds are not particularly attracted to the barbed grain, the spines not being removed in the cleaning process. The following method of preparation is recommended :—Dissolve one ounce of strychnine sulphate in hot water and thicken with starch to the consistency of thin soup (about one pint). Dissolve one ounce of bicarbonate of soda in half a pint of hot water and add a little at a time to the poisoned starch till effervescence ceases ; then add two ounces of "corn syrup (karo or equal)" and one drachm of saccharine, mix well and apply to the grain, stirring constantly until the strychnine is evenly distributed throughout, and the grain is thoroughly dry. The bitter taste of the strychnine is concealed for several minutes and the squirrels may have placed considerable quantities in their cheek pouches before any bitterness is noticed. By this time sufficient strychnine has been absorbed through the mucous membranes of the cheek pouches to kill the animal.

Californian Valley quail, on the other hand, may be fed, under quite natural conditions, on relatively large quantities of strychnine without showing toxic symptoms—4 milligrams per 100 grams of body weight being the minimum lethal subcutaneous dose ; 0.09 milligrams per 100 grams body weight producing convulsions in the case of the ground squirrels. Nineteen grains of barley (containing 2-7 milligrams of strychnine sulphate) when retained in the pouch of ground squirrels proved fatal.

R. St. J. B.

JOHNSON (J. Pratt). **Prevention of Plague. Anti-plague Inoculation.**—*S. African Med. Rec.* 1916. Feb. 26. Vol. 14. No. 4. pp. 51-53.

The use of a prophylactic vaccine prepared from young agar cultures is here recommended in preference to the ordinary "Haffkine's prophylactic" which is obtained from broth cultures. Broth culture vaccines contain non-specific toxic substances arising from the growth of the microbes in the bouillon, and the local and general action observed among the inoculated is largely due to their presence ; the reaction caused, on the other hand by the employment of agar cultures is almost entirely due to the essential bacterial constituents of the vaccine.

The vaccine in question is advocated and supplied by the Clinical Research Laboratories, Johannesburg.

"The vaccine is supplied in single doses in 1 cc. ampoules, or in bulk in 25 or 50 doses in coloured bottles with paraffined rubber caps. These should be well shaken up before use, and in the case of the ampoules the neck should be broken off, and the ampoule inverted over the sterilised needle of the syringe, and the contents of the ampoule withdrawn into the syringe. In regard to the bottle, the paraffined rubber cap should first be swabbed over with iodine, and a sterilised needle of a 1 cc. syringe, plunged through the cap. One cc. may then be withdrawn by inverting the bottle and slowly drawing out the piston. After use the puncture should be sealed by rubbing over the cap a probe or pair of forceps sufficiently heated to melt the wax. On no account should the cap be removed.

"The dose for adults is 1 cc., the dose being correspondingly decreased for children, and for infants a dose of .1 cc. is recommended. The requisite dose should be inoculated into the subcutaneous tissues in the sub-clavicular region, preferably late in the afternoon or evening; it is advisable to arrange that for 24 hours after inoculation as much rest be taken as possible. In view of this fact, it is convenient, in many cases, to carry out inoculation on Saturday afternoon or evening.

"A second inoculation of a similar dose at the end of one week is strongly recommended, and the inoculation of a third similar dose, after an equal interval, is advantageous."

The general reaction is slight, the temperature rising 1 or 1½ degrees, and the local reaction is by no means as marked as with Haffkine's prophylactic and disappears in a couple of days.

R. St. J. B.

MITCHELL (J. A.) & ROBERTSON (G. W.). A Note on the Transmission and Examination of Plague Specimens.—*S. African Med. Rec.* 1916. Mar. 11. Vol. 14. No. 5. pp. 71-72; and *Jl. Trop. Med. & Hyg.* 1916. July 1. Vol. 19. No. 13. pp. 153-154; and *Lancet.* 1916. Apr. 29. pp. 932-933.

The use of Broquet's solution (neutral glycerine 20 cc., distilled water 80 cc., calcium carbonate 2 grammes) as a medium for the preservation of plague material during transmission to the laboratory, has not been attended with success in South Africa. The plan usually followed was to cut cubes of the suspected tissue (about an inch square) from the liver, spleen, etc., and to forward them in wide mouthed bottles of solution. The solution effectively prevented putrefaction, but it rendered smears from the sections much more difficult to fix on the slides. The best results were obtained by using the central parts of the cubes, but it was found that inoculations gave negative results in several cases in which there were strong microscopic, clinical or epidemiological reasons for suspecting plague.

"Subsequent experience fully confirmed the suspicions originally aroused. In one recent case, cubes of tissue obtained *post mortem* from a native child, despatched from Queenstown to Capetown on 5th June, 1915, in Broquet's solution, gave negative results after inoculation into two guinea pigs on 8th June, whereas a guinea pig inoculated with the fresh material at Queenstown on 5th June gave a positive result, dying of typical plague on 11th June.

"It is clear from Dr. Broquet's original paper that stronger solutions of glycerine have an undoubted effect in devitalising the plague organism. He states, however, that a solution of 20 to 25 per cent. of glycerine prevents the growth of other germs and preserves the virulence of the plague bacillus for eight or nine days, or, with the addition of calcium carbonate, for 13 days, but that the virus is attenuated, as shown by the lengthening of the period between inoculation and death of inoculated guinea-pigs. We are unaware whether Dr. Broquet's experiments were carried out at the low temperatures of a Manchurian winter, but in any case they are certainly not borne out by our experience in the warm climate of South Africa, which has been that transmission in the 20 per cent. glycerine solution, even for three or four days, markedly reduces or even entirely destroys the virulence of the plague organism for guinea-pigs, and is thus apt to render the examination of material so transmitted useless or even misleading."

R. St. J. B.

SLEEPING SICKNESS.

NYASALAND PROTECTORATE. Sleeping Sickness Diary. [H. HEARSEY, Principal Medical Officer.]—Pt. 25. 12 pp. Zomba: Printed by the Government Printer.

This instalment of the diary is dated 31st December, 1915, and is signed by Dr. HEARSEY, P.M.O. He states that during the year investigations have been confined to the Proclaimed Area in the Dowa District and that 29 cases have been found, 25 in the Proclaimed Area. Histories of these cases are given, the last being numbered 240. Most of the infections were detected shortly before death. The following case is of special interest and recalls one published in Part 23 of the Diary [this *Bulletin*, Vol. 4, p. 351]:—

“*Case No. 218.*—Sapitidwa, an elderly female of Kabwabwa village, Dowa district. A blood film was made on the 23rd March and examined while travelling, with a negative result. On going over old films on the 18th April a trypanosome was found in this film, and after a long search, a second one. On examination she appeared perfectly well and stated that she had only been ill for two days when the film was made; since then she has been at work. Two fresh films were examined for about an hour but no trypanosomes were found; a permanent preparation was then made but no trypanosomes have been found in it. The glands on the left side of the neck are shot-like; on the right side none can be felt. She is well nourished and active; T. 99°, P. 48, and appears to be in excellent health. Her blood (both thick and thin films) has been periodically examined, with negative results, and she has maintained her good health. When visited at the end of December, that is to say nine months after the film showing two trypanosomes had been taken, she seemed perfectly well, and a film made that day and subsequently examined at leisure was negative. On the 24th December, 1 cc. of her blood was withdrawn and citrated and brought up to Kasu where it was inoculated into a healthy monkey, with negative result.”

During the last two months of the year Dr. DAVEY carried out some experimental work, starting a transmission experiment with bugs and inoculating ten monkeys with the blood of ten apparently healthy natives in the area. The results to date were negative. A free-shooting area was opened in the Marimba district, the holders of permits to take blood smears from all animals killed. DAVEY has examined 25 of these and the results are tabulated. Trypanosomes were found in two eland and two roan antelope, or 16 per cent. It is pointed out that the Sleeping Sickness Commission found 31·7 per cent. infected in a part of the same area. [This Commission found 57 wild animals harbouring trypanosomes believed to be pathogenic out of 180 examined. The blood was in each case inoculated into a goat, a monkey and a dog, and thick as well as thin smears were searched.]

A. G. B.

JOJOR (Ch.). Note sur la lutte contre la maladie du sommeil au Cameroun 1913-1914.—*Bull. Soc. Path. Exot.* 1916. May. Vol. 9. No. 5. pp. 303-305.

Owing to the conclusion of the treaty of November 1911, whereby the basin of the Upper Sangha was handed over to Germany, a Mission, well equipped both in personnel and appliances, under Dr. KUHN, came into existence in Cameroon in 1913. It was divided into two

parties, one of which worked on the upper course of the river Njong to the east of Jaunde, the other on the Mambere (Upper Sangha). Many curative injections were given and clearings made. A rigorous passport system came into force. All this was interrupted by the war, which has caused migrations of tribes and movement of large columns of armed natives and of porters from French and Belgian Congo. Now that military operations are over it will be necessary to deal with this fresh danger.

A. G. B.

DANIELS (C. W.). Eye Lesions as a Point of Importance in directing Suspicion to Possible Trypanosome Infection.—*Ophthalmoscope*. 1915. Vol. 13. pp. 595-597.

Dr. Daniels draws attention to the significance of eye lesions as a sign of trypanosomiasis, having regard to the importance of early treatment. He gives seven grounds for suspecting this infection, amongst them "orchitis (often absent throughout)" [this is usually considered a rare accompaniment]. Eye lesions, being painful, cause the patient to get medical advice. A positive Wassermann may be obtained. "The eye lesions are essentially a toxic iridocyclitis; with this there is a varying amount of keratitis, circumcorneal congestion, conjunctivitis, and photophobia, which may be severe or trivial." Deep oedema of the lower eyelids is also noted. He refers to his paper on recurring keratitis in a dog, caused by human trypanosomes [*Sleeping Sickness Bulletin*, Vol. 3, p. 273]. The following table shows strikingly the high proportion of patients with eye lesions:—

	Cases.	Deaths.	Eye lesions.	Percentage with Eye lesions.
Rhodesian Cases	6	6	5	83·3
Nigerian Cases	10	3	4	40·0
Uganda, Congo, and other parts of Tropical Africa	16	3	3	17·8
Total	32	12	12	37·5

In four cases it was the eye lesions that led the patient to seek medical advice.

A. G. B.

BLIN (G.) & KERNÉIS (J.). Note concernant le premier cas de maladie du sommeil constaté chez un Européen en Guinée Française.—*Bull. Soc. Path. Exot.* 1916. Apr. Vol. 9. No. 4. pp. 231-234.

In August 1914 the patient had a "bouton," a sort of blind boil, on the left leg with marked oedema and fever. The swelling was incised but no pus came out. Shortly after there appeared patches of redness over the leg and body so that the diagnosis of syphilis was considered. Increasing loss of strength and weight followed. In November there was loss of sexual desire and Kerandel's sign, which persisted for seven months. Headaches became frequent. On admission to hospital in March 1916 there were patches of redness all over the body, in some places annular, in others S-shaped. The skin of the left thigh was thickened and measurement showed the left lower limb to be larger than the right. A search for the embryos of *Filaria nocturna* was

negative. The glands of several groups were enlarged and trypanosomes were obtained from the juice of one in the neck. It is believed that the patient was infected at Mamou, which is known to be a centre of sleeping sickness, and this is the first recorded case of infection in a white man in French Guinea. Injection of atoxyl produced a speedy amelioration.

A. G. B.

LAMBORN (W. A.). Third Report on *Glossina* Investigations in Nyasaland.*—*Bull. Entom. Res.* 1916. May. Vol 7. Pt. 1. pp. 29-65. With 11 figs.

The author has completed his survey of the distribution of *Glossina morsitans* in the areas described by SHIRCORE as "primary centres 1 and 2." As in the case of the other primary centres he had "not been able to find that the fly is sufficiently localised, even when the dry season is far advanced, as to render feasible any attempt to control it by prophylactic clearing of the bush [cf. this *Bulletin*, Vol. 6, p. 174].

Parasites.—*Mutilla glossinae* Turner has been bred from pupae of known history, i.e. not subjected to other parasites, and thus has been indisputably proved to be a direct parasite. The pupa is attacked chiefly in the later stages. Breeding experiments have been conducted on a large scale. Up to the 6th October 470 pupae subjected to female Mutillids had yielded a total of 173 of the parasites, giving a percentage of about 36 and a balance of 114 pupae still remained. The examination of 9,285 pupa cases found between April and June, from the same locality, shows that 353 had been parasitised, a percentage of rather over three, and later figures show a percentage of 6·3. It is noted that the length of time occupied by the *Mutilla* in the development in the tsetse pupa varies considerably, leading the author to suspect that emergence may be determined possibly by climatic changes. With the advent of the dry season there has been a remarkable increase in the numbers of *Mutilla glossinae* that have emerged from pupae from Monkey Bay in the author's possession, so that "it is not a little remarkable that only two parasites, one a Mutillid and the other a Bombyliid, have emerged from pupae obtained within the Proclaimed Area."

A second Mutillid parasite has been obtained at Monkey Bay; it is described elsewhere in this number. With regard to *Syntomosphyrum glossinae* Wtrst., evidence has been obtained that these insects are hyper-parasitic on *Mutilla glossinae* and that the *Mutilla* may be attacked at any stage in its development, whether as larva or pupa. Out of 9,285 empty pupa cases found about 3 per cent. showed the small round opening [see this *Bulletin*, Vol. 7, p. 284]. An account is given of the bionomics of another hyper-parasite, *Eupelminus tarsatus* Wtrst. Some large Chalcids, species of *Stomatoceras*, emerged from pupae in the Monkey Bay vicinity between April and June. The precise relationship of these to *Glossina morsitans* is still undecided.

After a discussion of the relationship of the fly to the larger animals the author goes on to—

Artificial Breeding Places.—A large number have been constructed. Details are given. They have been made by felling trees at intervals both near Monkey Bay and in the Proclaimed Area. In the former

*The second Report was summarised in this *Bulletin*, Vol. 7, p. 110.

they covered an area of two square miles. Here the great majority of the natural breeding places have been eliminated. In some instances soil was brought in. The fallen trees were easily disposed of, the portable timber being piled round the large trunks and ignited. In nine of these artificial breeding places made in August, 59 living pupae and 39 cases were obtained in January. The author writes, "it would almost appear as if the flies had exercised a judicious selection in their choice of places for the reception of their pupae, preferring artificial ones which fulfil presumably all their requirements to the natural ones, many of which cannot in respect of drainage, protection from sun and rain, etc., be as wholly satisfactory." Thirty artificial breeding places in another area yielded 98 pupae and 34 pupa cases. He thinks that the possibility of checking the flies through artificial breeding places has been established.

Effect of Bush Fires on the Flies' Distribution.—The result of a fire near the road running west from Domira Bay was a marked diminution in the number of flies in the burnt area, but on camping at the spot on the banks of the river where the author had stopped previously in comfort for weeks, he was so beset by flies in his tent that he found it necessary to move. These flies are considered to have come in partly as the result of the fires and partly owing to the driving away of the game; "but, apart from these flies, there were pupae enough under logs untouched by the fires soon to repopulate the burnt area." The fires are so fleeting that they do not do more than char most of the logs which form so large a proportion of the breeding places. He does not think that systematic burning of the grass is likely to be of value for controlling the fly. Where fires have been extensive and the game driven away, the newly emerged fly can subsist on warthog, which grubs up roots.

Proportion of the Sexes.—It is well-known that the readiest method of obtaining tsetes is for the collectors to catch them off each other, and in these cases females of *G. morsitans* invariably bear a small proportion to males. Different figures are obtained "if captures of flies which have settled near to the possible host are included." As the easiest method of securing these an umbrella was carried and captures were made by boys off one another and off the umbrella. The results are tabulated. The proportion of females captured off the umbrella worked out at 35 per cent. (343 ♂, 189 ♀), whereas when captures were effected in the usual way the percentage was 10 (331 ♂, 36 ♀). During the heat of the day the numbers of *morsitans* are much diminished. The author sought for the missing flies and found them, females in greater proportion, on the larger trees, baobabs in particular. The females are to be seen in the recesses between the buttresses and in the hollows and fissures of the bark of the older trees. It was also obvious that a far larger number of the females caught on the trees had recently fed than of those captured otherwise. These points are illustrated by a table. The interpretation of the disparity of the sexes in captures is given thus:—

"The males, most of which are already replete, attend man largely to await the arrival of females coming to feed, hence the inequality in numbers in ordinary captured series; for whereas the males have a double object, the females have that of feeding only. On arrival the female may be secured by one of the males, or if pregnant, may be driven away in its endeavours to escape their attentions, then settling near by and renewing

its attempts to feed from time to time. Having fed, it retires to the shaded recesses of large trees or to breeding places more or less remote from where the flies happen to be massed at the time, its object being to keep free from the males. As there is so great an increase in the numbers of the females taken off the trees and by other special collecting methods, it is practically certain that the sexes exist in the same area in equal numbers in accordance with the expectation from laboratory results."

Attempts were made to catch the flies, on these trees, by means of brown paper smeared with bird lime in the recesses and by thatched shelters bird-limed on the inner side, but with no success.

The breeding season.—In October, when the rains were about due, the pupal period averaged about 21 days; earlier in the dry season it may last certainly as long as 10 weeks. This variability doubtless enables the race to tide over the trying period of the dry season when the conditions of life must threaten the existence of the imagos.

A. G. B.

LLOYD (Ll.). **Report on the Investigation into the Bionomics of *Glossina morsitans* in Northern Rhodesia, 1915.**—*Bull. Entom. Res.* 1916. May. Vol. 7. Pt. 1. pp. 67–79. With 1 plate and 2 figs.

In July 1914 the author selected a base camp near Kashitu station, mid-way between Broken Hill and Ndola and decided to let his investigations "centralize round" *Mutilla glossinae*, recently found on the Kafue river [this *Bulletin*, Vol. 6, p. 175].

Density of Fly in Relation to Game.—In Kashitu game is "not particularly uncommon" but the animals "do not return to the same spots day after day to feed. . . . The consequence is that the fly is very hungry and both sexes swarm round any person passing through and are all eager to feed. This eagerness to feed gives one at first a false impression of the numbers of fly in the area compared with fly areas in which game is numerous and little disturbed." Moreover where game is very plentiful the proportion of female flies is much smaller than where it is not plentiful. Table I. shows this:—

TABLE I.

Comparing the Catches of Fly in relation to the Amount of Game in an Area.

Locality.	Game.	Period.	No. of catches.	Total ♀ flies.	Total ♂ flies.	No. per net per day.		Percentage of ♀ flies.
						♀	♂	
Nawalia ..	Very plentiful.	Sept. to Dec.	46	727	4849	3.2	21.0	13.0%
Ngoa ..	Very plentiful.	Dec. to July	79	1315	—	4.2	—	—
Kashitu ..	Not plentiful.	Oct. to March	41	1219	1722	7.9	10.5	41.5%

The pupa collecting also shows that the fly is less numerous than it appears to be in the areas where game is scanty. Another table illustrates this. At Ngoa a collector could find four times as many in a day as at Kashitu. Six instances are given showing the mutual relations of the prevalence of game and of pupae on the one hand, and the hunger of the fly on the other. In one place "in four collections 989 pupae and 1,325 cases were taken. . . . Very few tsetse were seen and these were not hungry." In another place deserted by game, "one search yielded ten pupae and 71 empty cases. A great deal of fly was seen and all the workers were badly bitten." A table includes these and similar figures. As the author writes, "by comparing the numbers and behaviour of the fly in areas where game is plentiful and those in which it is scanty, some hints may be obtained as to what would be the result of the much desired experiment in game destruction."

Destruction of Pupae by Bush Fires.—Of the pupae collected the mortality was much higher in those from the areas over which fires had passed at Ngoa. In unburnt areas it ranged from 10 to 18 per cent. (1,578 pupae); in burnt areas from 28 to 30 per cent. (2,041 pupae). The excess of mortality is attributed to the fire.

Breeding places.—Of 700 examined all agree in that very close to each is some "relatively dark hiding place for the flies." Pupae having been found in narrow hollows in the ground, "it is only reasonable to suppose that [the flies] also breed in the fissures in the earth which are so plentiful in the Luangwa Valley." In less than 100 yards of sand in a stream bed above and below a waterfall 717 pupae and 92 cases were taken in three mornings. Attention is drawn to the similarity of these breeding spots to those of *G. palpalis*.

Parasites.—Six species have been met with. *Mutilla glossinae* is the one most generally distributed. The larva is described and figured. When fully grown it spins a very strong papery cocoon and then is apparently independent of the tsetse puparium. The mature insect bites a round hole in the cocoon and puparium for emergence, usually at the anterior end. The adults were fed on jam. This parasite is "generally distributed in *morsitans* areas in N. Rhodesia." At Chutika 7 per cent. of 1,164 pupae were parasitised, at Nawalia 13 per cent. of 155 (a photograph is given of the place where these were found), at Ngoa 0.5 per cent. of 2,500. Over most of this last area the parasites were not found. Three other hymenopterous parasites met with were *Anastatus viridiceps* Wtrst., *Stomatoceras micans* Wtrst., and *Syntomosphyrum glossinae* Wtrst. Two species of dipterous parasites were met with, one being *Villa lloydi* Aust. The larva and pupa of this are figured.

Source of food.—"Nucleated red cells have been found with tolerable frequency in *G. morsitans*" and the flies have been seen feeding on a ground hornbill at liberty in the camp, this being the first observation of the kind. Wild flies put on the shaved bellies of rabbits filled themselves with clear fluid, which is thought to have been peritoneal.

The Importance of Compact Villages in Fly Areas.—The cases of sleeping sickness found in the Luangwa valley have been partly centred round four villages, three of which are known to the author. They "differ from the generality of the Luangwa villages in that they are shady and scattered." They are described.

"Each of these places where the local epidemics have occurred contains the three requisites for the life of the fly, food, shade and potential breeding places, while most of the Luangwa villages lack the two last of these. Lack of shade probably accounts for the fly leaving the usual type of village. In these shady places the natives are always liable to come into much the same relation to *G. morsitans* as are natives in *palpalis* areas to *G. palpalis*, by repeatedly passing the shady spots where the flies lurk. An infected fly brought into a village of this type or to one of the shady water-holes could easily remain long enough to infect a number of people. The writer does not believe that *G. morsitans* could ever subsist entirely on man, as it is so rarely that a fly obtains a full meal on a healthy person, European or native, but where domestic animals remain, as in the case of each village mentioned above at the time of the epidemic, the fly might be able to breed actually in this unusual type of village. At any rate the shady and scattered nature of the villages where these local epidemics have occurred seems to indicate their cause.

"The epidemics could probably be avoided by allowing no shade in the villages and by making these compact. Two villages should never be allowed on opposite banks of the temporary streams, nor where stretches of shaded sand are left by the falling of the water. The clearing of the bush around water-holes in these streams however is a difficult problem, as the water would fail if the shade were removed."

A photograph is given of one of these shady and scattered villages.

A. G. B.

TURNER (R. E.). On Mutillidae parasitic on *Glossina morsitans*.—*Bull. Entom. Res.* 1916. May. Vol. 7. Pt. 1. pp. 93-95. With 2 figs.

The male of *Mutilla glossinae* is described from Monkey Bay (LAMBORN) and a new species, *M. benefactorix*, from the same locality is described, with a figure of each sex. This also was bred from pupae of *G. morsitans*.

A. G. B.

STUEHMER (A.). Ueber lokale ("primäre") Krankheitserscheinungen an der Stelle der Infektion bei der Ngana-Erkrankung des Kaninchens ("Trypanosomenschanter"). Ihre Bedeutung für die Beurteilung des Verlaufes der Kaninchentrypanosomiasis. Uebergang des "primären" in das "sekundäre" Krankheitsstadium (Rezidivstammbildung). [Local Phenomena at the Site of Inoculation in Nagana of Guinea-pigs. Their Significance in Estimating the Progress of the Infection. Transition from the Primary to the Secondary Stage.]—*Zeitschr. f. Immunitätsforsch.* 1. Teil. Orig. 1916. Mar. 4. Vol. 24. No. 4. pp. 315-335.

The writer refers to STARGARDT's paper on syphilis and trypanosomiasis [see this *Bulletin*, Vol. 4, p. 253] and to the chancre-like lesions which he produced in rabbits by inoculating a small number of trypanosomes into the bulbar conjunctiva. Working in NEISSER's laboratory he repeated STARGARDT's experiments with a strain of nagana, and in a series of 25-30 guinea-pigs obtained cent. per cent. positive results. The trypanosomes came from mice and in the suspension used two trypanosomes were present in each field (Zeiss DD, Compensating Ocular 6). The development and character of the lesion produced, a sharply circumscribed oedematous swelling, is described. In it could be demonstrated crowds of trypanosomes when as a rule they could not be found in the blood or in inoculated animals. The trypanosomes

multiply chiefly in the connective tissue layer immediately under the epithelium and extend into the tissue spaces towards the periphery and the inflammation slowly spreads from the site of injection to the whole of the upper half of the conjunctiva. A few find their way into the cornea itself, causing smoky opacity. Later they are found in the lymph channels. The same result was obtained when the inoculation was made into the skin of the scrotum. The author regards these lesions as similar to those of syphilis and would call the local infection primary trypanosomiasis.

The author then states the following questions as requiring an answer—When does general infection of the body occur? Can any laws be recognised as to the appearance of trypanosomes in the blood? How does the body react? The result of his attempt to answer them is given in the summary.

With regard to serum fast relapse strains reference is made to a paper by RIRZ [this *Bulletin*, Vol. 4, p. 265], who differentiated in the mouse 17 such strains, all differing strongly in their immunisation properties. An example is given of a rabbit inoculated in the left side of the scrotum on June 30th, in the left eye July 4th, in the right eye July 7th, and the right side of scrotum on July 12th. Following the first and second inoculations were well-marked local lesions containing trypanosomes. The third and fourth had no result. Trypanosomes were found in the blood on July 4th and 5th and again from July 9th onwards, not in the interval. On the occasion of each inoculation the blood serum was examined for bodies immune to the original strain.

The author's conclusions are to this effect:—

(1) With the strain of trypanosomes used (Morgenroth's from Ehrlich's Institute) he succeeded every time in producing local lesions on the conjunctiva and the scrotum in rabbits.

(2) Large numbers of trypanosomes were found in the affected tissues and general infection followed after three to five days.

(3) Pathologically the "chancres" are much like the local spirochaetoses of men and animals. In accordance with the nomenclature in syphilis this local trypanosomiasis would be known as "primary trypanosomiasis."

(4) As soon as the local lesion is completely formed the trypanosomes become dispersed in the circulation. Those which first appear there have the properties of the original strain.

(5) There follows a gradual increase in production of antibodies, which reaches its height in 7-8 days. The trypanosomes disappear almost completely from the blood, to become numerous there again about the 9th day.

(6) Thus relapse strain No. 1 is formed. It is distinguished from the original strain by its fastness to the antibodies of the first order and may be called the serum-fast secondary strain.

(7) Owing to the increase of antibodies in the blood reinfection with the original strain succeeds only up to the fourth-fifth day. Once the secondary strain is formed, the original strain ceases to infect.

(8) As soon as the serum-fast secondary strain is formed the so-called late phenomena occur in rabbits, oedema of the genitals, of the lips, ears, etc. These the author regards as "secondaries" [*Sekundärer-scheinungen*] because they are produced by the secondary strain.

(9) The "secondaries" cannot present themselves until the trypanosomes by mutation have eluded the action of the antibodies. It is then that the parasites find their way to the body tissues. An interval elapses before the body forms fresh substances protective against the altered trypanosomes. In the meantime the tissues directly affected can keep off the attackers only by inflammatory reaction.

(10) Primary and secondary trypanosomiasis in rabbits forms excellent material for the solving of various therapeutical problems, especially salvarsan dosage.

A. G. B.

OFFERMANN. Ueber die serologischen Untersuchungsmethoden als Hilfsmittel zum Nachweis der Trypanosomenkrankheiten, im besonderen der Beschälseuche. [Serological Methods of Investigation as Aids to the Diagnosis of Trypanosome Infections, especially Dourine.]—*Arb. a. d. Kaiserl. Gesundh.* 1915. Sept. Vol. 50. No. 1. pp. 1-30.

The conclusions of the author, who is an army veterinary surgeon, may be summarised as follows:—

Sera obtained from healthy rabbits often possess the property of checking haemolysis. This property is not constant; in some sera it is very evident, in others it is nearly or quite lacking. The author did not meet with it in experiments in which 0·01 cc. of serum or less was used. When rabbit serum is used for complement binding experiments the serum should be tested before infection.

Agglutinins causing agglutination of dourine trypanosomes were not demonstrable in normal rabbit serum. In the serum of rabbits infected with these trypanosomes complement binding antibodies and agglutinins could be demonstrated, but not always simultaneously. Usually the complement binding amboceptors were found before the agglutinins, the first generally 8-9 days after infection, the second 12-13 days. Both occurred in the blood later than the trypanosomes, 4-9 days and 4-22 days later respectively. In time and quantity the occurrence varied with the individual and course of disease. They often diminished, to increase again later, but this phenomenon was irregular. They never disappeared altogether. If the serum was preserved sterile, antibodies could be still demonstrated after many months.

For agglutination fresh trypanosome suspensions must be used. If kept in the ice chest the antigens from these suspensions retain their complement-binding powers for weeks.

Complement fixation and agglutination can be used as diagnostic aids; the former gives better results.

[A list of references appended does not contain the name of WATSON, who has established the complement-fixation test "as a sure, safe, and specific method of diagnosing dourine" (this *Bulletin*, Vol. 6, p. 382 and elsewhere).]

A. G. B.

RODHAIN (J.) & Van den BRANDEN (F.). Sur la réceptivité de la roussette, *Cynonycteris staminea*, aux différents virus de trypanosomes africains.—*Bull. Soc. Path. Exot.* 1916. Apr. Vol. 9. No. 4. pp. 234-236.

The authors recall that LAVERAN inoculated a bat of the species *Pteropus medius* with surra with success; otherwise the bat does not

seem to have been used in laboratories. They themselves inoculated two bats of the species named in the title with rat's blood containing *T. lewisi*; no infection was contracted. Two bats were inoculated with sheep's blood containing trypanosomes of the *cazalboui-vivax* type; no infection. Two bats were inoculated under the skin and one in the peritoneal cavity with blood containing *T. congolense*; no infection. On the other hand, a bat inoculated with guinea-pig blood containing *T. gambiense*, and a second from the first, contracted chronic infections with death after 52 and 68 days.

The bats used for the experiments were infested with Nycteribidae, *Cyclopodia greffi*. The authors thought it possible that *T. gambiense* might undergo some development in the digestive tube of these insects. They first of all dissected 25 to see if they contained flagellates; none were found. They then examined eight *Cyclopodia* born in the laboratory and placed for periods varying from days to weeks on a bat, the blood of which always contained *T. gambiense*. Trypanosomes showing signs of degeneration were found in the stomach but none in the mid-gut or hind-gut. The conclusion is that *T. gambiense* appears not to undergo any development in *Cyclopodia greffi*.

The paper is dated from the Leopoldville laboratory. A. G. B.

RODHAIN (J.) & Van den BRANDEN (F.). Action comparative des matières colorantes : trypanosan et trypanbleu et des arsenicaux : salvarsan cuprique, sur les trypanosomes animaux Africains des groupes *congolense* et *angolense* (*cazalboui-vivax*).—*Bull. Soc. Path. Exot.* 1916. Apr. Vol. 9. No. 4. pp. 236–241.

The authors have already reported that trypanosan is the best remedy in the kid for infections caused by trypanosomes of the *dimorphon-congolense* type in Lower Katanga [see this *Bulletin*, Vol. 2, p. 573]. Their present paper comes from the Leopoldville laboratory. They find that trypanosan given by the mouth in a dose of 0.5 gm. per kilo body weight to the sheep, goat, native pig, and guinea-pig makes the trypanosomes disappear after 24 hours. A goat received 13 gm. of the drug in three days without being poisoned. Six experiments are given. Trypanblue has no action on *T. congolense*, as is shown by the results of three experiments. It is well-known, the authors say, that trypanosomes of the *congolense* group are not influenced by arsenicals. They have found that cupric salvarsan also has no action on this trypanosome (two experiments).

In 1911 they showed the susceptibility of *T. cazalboui (vivax)* to trypanosan. Two more experiments in sheep confirm this observation. The trypanosome of the *cazalboui-vivax* type had not shown itself susceptible to trypanblue; a lamb and sheep were treated. The conclusions are to this effect:—

1. Trypanosan is the drug of choice against infections produced by the trypanosome of *congolense* type.

2. Trypanblue and cupric salvarsan have no action on *T. congolense*.

3. The trypanosome of *cazalboui* type is susceptible to trypanosan, but not to trypanblue.

4. Cupric salvarsan has appeared to have only a temporary action, almost nil, on the development of *T. cazalboui* infection in the sheep.

A. G. B.

LANFRANCHI (A.). **Opothérapie et opoprophylaxie dans les Trypanosomiasés.**—Communication faite à la Société de Pathologie Comparée. 1914. Apr. 7. 7 pp.

The conclusions reached are to this effect :—

(1) The inoculation of extract of dog spleen into dogs at the height of infection with *T. brucei* does not destroy the trypanosomes present in the blood, does not lead to a diminution in their number, and does not produce trypanolytic crises.

(2) Repeated inoculations of increasing doses of spleen extract before experimental trypanosome infections (*T. brucei*) make the animals more resistant.

(3) This resistance seems more marked in animals inoculated intravenously.

The second conclusion rests on two experiments, in one of which three puppies so treated survived longer than two controls of the same litter, and in the second of which the treated dog lived 24 days, as against 17 for the control, and in the course of the infection had three trypanolytic crises; in the controls the trypanosomes increased steadily till death. Tables give the salient points of the two experiments.

A. G. B.

LANFRANCHI (Alessandro). i. **Su la possibile trasmissione delle tripanosomiasi animali nell' uomo.** [On the possible Transmission of Animal Trypanosomiasis to Man.]—*Bull. d. Sci. Med.* 1915. Vol. 86. Ser. 9. Vol. 3. 18 pp.

ii. **Ulteriori ricerche sulla possibile trasmissione delle Tripanosomiasi animali nell' uomo. Le reazioni biologiche nelle tripanosomiasi umana ed animali nella identificazione del virus.** [Further Researches on the Possible Transmission of Animal Trypanosomiasis to Man. The Biological Reactions of Human and Animal Trypanosomes in Identifying the Virus.] Notes I, II, III.—*Rendiconti d. R. Accad. dei Lincei.* 1916. Feb. 6 & 19. Vol. 25. Ser. 5a, 1 Sem. Nos. 3 & 4. pp. 195-198; 230-234; Apr. 16. No. 8. pp. 601-605.

Professor Lanfranchi, having had the misfortune to infect himself accidentally with one of the strains of trypanosome in his laboratory, instituted the series of researches described in the above papers, using his own serum as the basis of his experiments. The fact of being under treatment with atoxyl at the time was held not to vitiate the results. The trypanosome was either *T. brucei* or *T. evansi*, there being no others in cultivation in the laboratory at the time. In these memoirs it is provisionally distinguished as virus Lanfranchii. Tested by the trypanolytic power of the serum it approximated rather to *T. gambiense* than to *T. evansi* but, in its protective (to laboratory animals), precipitating and complement-fixing powers, it approximated more nearly to the latter.

J. B. Nias.

LANFRANCHI (A.) & VALLA (G.). i. Dell' azione del siero umano, normale e specifico, su la morfologia dei tripanosomi in rapporto ai metodi tripanometrici. [The Action of Normal and Specific Human Sera on the Morphology of Trypanosomes, in Connection with Trypanometric Methods.]—*Boll. Soc. Med. di Parma*. 1914. May 2. 11 pp.

ii. Dell' azione del siero umano, normale e di affetto da tripanosomiasi, su la morfologia del *Tripanosoma gambiense*, in rapporto ai metodi tripanometrici. [The Action of Human Serum, both Normal and Trypanosomic, on the Morphology of *T. gambiense*.]—*Ibid.* June 19. 8 pp.

LANFRANCHI (A.) & SANI (L.). Dell' azione del siero, umano, normale e di affetto da tripanosomiasi, su la morfologia del *Tripanosoma evansi*, in rapporto ai metodi tripanometrici. [On the Action of Human Serum, Normal and Trypanosomic, on the Morphology of *T. evansi*.]—*Ibid.* June 19. 8 pp.

LANFRANCHI (A.) & SCOTTI (G. B.). Dell' azione del siero umano, normale e di affetto da tripanosomiasi, su la morfologia del *Tripanosoma rodesiense*, in rapporto ai metodi tripanometrici. [The Action of Human Serum, Normal and Trypanosomic, on the Morphology of *T. rodesiense*.]—*Ibid.* 1914. June 19. 8 pp.

These four papers are concerned with the measurements of trypanosomes, after subjection to the action of normal and trypanosomic human blood sera respectively. The method employed was as follows. Rat's blood containing plenty of trypanosomes was mixed, in the proportion of 0.20 cc. with 1 cc. of normal human serum, specific serum and normal salt solution respectively, and, after three minutes of contact, the mixtures were injected into the peritoneal cavity of rats. From the blood of these rats microscopic preparations were made, in which the trypanosomes were measured micrometrically. Not very much difference was to be noted in the action of the two kinds of sera, but with the specific there was a tendency towards a reduction of the maximum measurements obtained.

[On account of the amount of detail this series of papers should be consulted in the original by the student.]

J. B. N.

LANFRANCHI (A.). Su possibile passaggio dei tripanosomi nel latte. [On the Possibility of the Passage of Trypanosomes into the Milk.]—*Rendiconti d. R. Accad. dei Lincei*. 1916. Mar. 5. Vol. 25. Ser. 5a. 1 Sem. No. 5. pp. 369–373.

Trypanosomes of the four types *brucei*, *evansi*, *rhodesiense* and *gambiense* were injected into bitches that had recently given birth to litters of puppies, in order to see whether infection would take place through the milk. The milk and the blood of the puppies were injected into rats. The results were negative with *evansi*, but, with the other three, transmission was obtained; least decisively so with *rhodesiense*. With the latter, one rat showed infection when injected with milk, but inoculation with puppy blood gave negative results in every instance.

J. B. N.

YAKIMOFF (W. L.) & SCHOKHOR (N. J.). A propos du *Trypanosoma theileri* au Turkestan russe.—*Bull. Soc. Path. Exot.* 1916. Apr. Vol. 9. No. 4. p. 229.

By culturing the blood of nine Bovidae in Taschkent on ordinary bouillon in 1913, an infection with *Trypanosoma theileri* was demonstrated by the authors in eight cases. The examination of the peripheral blood of more than 1,000 Bovidae has been negative. At Termese out of 191 preparations of liver smears of Bovidae, one showed a trypanosome of the type *T. theileri*. The extremities, especially the posterior one, were greatly drawn out. The nucleus was central. The flagellar border of the undulating membrane stained well, but the free end of the flagellum could not be seen because of erythrocytes and hepatic cells.

Trypanosoma theileri thus occurs at Taschkent and Termese and probably other places in Russian Turkestan.

H. B. Fantham.

FEVERS IN THE TROPICS.

CAIRNS (P. T.). Notes on a Number of Cases of Fever, called Sun Fever, Influenza, Ephemeral Fever, Gastric Fever, in Upington and District during the Early Part of 1915, with a Suggestion as to the True Nature of the Disease.—*S. African Med. Record*. 1916. March 25. Vol. 14. No. 6. pp. 89-91.

During the first three months of 1915 a short fever appeared in an epidemic form amongst the troops in and around Upington. Not less than 251 cases were treated in the No. 7 Stationary Hospital, but there must have been many others to whom no hospital treatment was given.

The greater number of the cases occurred in the dry season preceding the rains. The disease itself had a sudden onset with general pains and severe headache, the pyrexia lasted about three days and the symptoms were very similar to those of the three day fever of Chitral. Relapses are stated to have been common and convalescence was slow. The author discusses the possible etiology and differential diagnosis. There was no evidence to show that water, food, or sun heat was the cause and, though no *Phlebotomus* flies were found in and around Upington, the author believes that the epidemic was one of *Phlebotomus* fever endemic in that area.

[There is evidently an interesting field here for an entomological investigation.]

P. W. Bassett-Smith.

PIETROFORTE (Vincenzo). Un' epidemia di febbre intermittente tropicale. (Low Intermittent Non Malarial Fever degli inglesi) nell' equipaggio della R. Nave "Piemonte" di stazione nel Mar Rosso.—*Ann. Med. Nav. e Colon*. 1916. Jan.-Feb. Vol. 22. Nos. 1-2. pp. 5-26. With 9 charts.

The author gives an excellent description of an epidemic of fever which occurred on board the R. Italian ship "Piemonte."

The disease was apparently contracted at Massawa and was so severe that the ship had to return to Italy. It was of the type known to us as non-malarial remittent or low fever. Out of a complement of 180 men 60 per cent. were attacked; of the deck hands 56 per cent., of the seventy stokers and engine room staff 55. The fever either was of an ambulant type lasting about eight days, or persisted four or five months with occasional short free intervals, the pyrexia being of an irregular intermittent character. The incubative period is said to be five days. Bronchial complications were not infrequent and a marked anaemia was produced with some enlargement of the spleen and lymphatic glands. The general condition of the patients was not markedly affected, but convalescence was slow. Residence in the hot climate of the Red Sea was undoubtedly a predisposing cause; mosquitoes, fleas, bugs, and cockroaches were abundant, the latter being possible "carriers"; the author sums up by saying that the disease was epidemic and was spread from man to man but the cause is still unknown. No parasites were present in the blood and serum reactions for typho-colon and melitensis groups were

absent. The disease is very similar to that described by CASTELLANI from Ceylon and India. It is evidently endemic in Africa and it probably produces an immunity both acquired and hereditary. Other cases have been described by VIVALDI in which lymphatic changes were marked, and by LUCATELLO who believes that a perverted internal secretion may be the cause.

P. W. B-S.

RUMMO (G.) & FERRANNINI (L.). *La cura chininica delle febbricole.*—*Riforma Med.* 1915. Oct. 9. Vol. 31. No. 41. pp. 1121-1124. With 1 chart.

A preliminary note on the curative action of quinine in cases of fever was made by RUMMO to the 20th. Congress of the Society of Medicine at Genoa in 1914. The present communication is a continuation of his work, with the assistance of FERRANNINI who carried out the laboratory experiments. The basic hydrochlorate of quinine was found to be most useful for the tests, which were made on members of the typho-colon group and the *M. Melitensis*. An aqueous solution which corresponded to about 3 per cent. of the dry salt or 2.4 of the alkaloid was used, and 1/10 of this added to the broth for the cultures, which were grown for 14 days at 37° C. The inhibitory action on *B. typhosus* was relatively small, that on *B. paratyphosus* A greater, on *B. paratyphosus* B most marked. Sub-cultures of these on to solid agar showed a diminished vitality of the organisms. It is noted that BISOGNA does not consider the conditions of the experiments in vitro analogous to that which would occur in the living tissues and blood. Quinine has anti-pyretic, neuro-cardiotonic and anti-malarial properties but "it is not presumed that the drug has a direct or elective action on the specific bacteria but that its efficacy consists in producing in the blood by its antiseptic and antitoxic action a change which renders this less suitable to the life of the respective micro-organisms."

The clinical research was carried out by Rummo at the Military Hospital, where cases of the fever were common, and of these ten are specially reported. Hypodermic injections of 1 gram to 1½ grams were given daily for 10 days and, if necessary, after an interval of four-five days a second or more courses were administered; in the more chronic cases the drug was given by the mouth. In acute cases of paratyphoid fevers the results were the best and it is pointed out that not only was the fever reduced but the titre of agglutination was also lowered during the treatment. Many patients with chronic fevers of uncertain origin were not benefited at all, the effects appearing to depend to a great extent upon the period when the treatment was started, the more acute forms reacting best.

P. W. B-S.

KAPP (Josef). *Eine eigenartige Epidemie. (Pappatacifieber, Influenza-oder Malaria. [A Peculiar Epidemic.]—München. Med. Woch.* 1915. Nov. 16. Vol. 62. No. 46. p. 1590.

This is a description of an outbreak of a peculiar fever among a large number of sailors after embarkation [place not stated] at the end of December and in January 1915 following a period of three weeks' rain. It is stated that the crew while employed both on board and

on shore were subject to unusual exertion, this acting no doubt as a predisposing cause. Thirty-three cases were noted and the illness usually lasted at most for ten days. After a period of malaise for two or three days, the fever set in accompanied by headache and pains in the limb muscles, and congestion of the mucous membranes of throat and mouth. There was obstinate constipation, and often catarrh or bronchitis. Generally the fever lasted three days it ended by crisis or lysis in an equal number of cases; this was marked by profuse sweats. In two cases bradycardia was marked. Herpes of the lips was the only eruption. The epidemic lasted for three weeks and died out without any special precautions being taken. Quinine appeared to give the best results, causing a fall of the temperature in twelve hours. [No mention is made of blood examinations, or the prevalence of mosquitoes or sandflies, but the symptoms point to the disease being phlebotomus fever.]

P. W. B-S.

HILL (R. A. P.). **Diagnosis of Fevers among the Mediterranean Expeditionary Force.**—*Lancet*. 1916. Mar. 4. pp. 504-506.

The author points out that the fevers in which no obvious cause can generally be found belong to one of the following groups, enteric (including typhoid and paratyphoid), malaria or amoebiasis, the possibility of undulant fever, kala azar and tuberculosis receiving due consideration. He states that a blood count is of great importance as a first measure and then a careful examination of a stained blood film which will clear up the diagnosis in many cases. Following these tests must be considered the therapeutic effects of quinine and emetine. A culture from the blood or excreta may of course give positive proof of the bacillary infective diseases, and agglutination reactions in uninoculated persons are useful. [The information supplied can be obtained from any up to date text book. No mention is made of dengue, phlebotomus fever, epidemic jaundice or so-called trench fever.]

P. W. B-S.

LURIE (G. A.). **A Case of Febris Colombensis.**—*Lancet*. 1916. Feb. 12. p. 350.

The case described is that of an Austrian who had been a prisoner in Serbia. He was treated at the American Clinic as an out patient and then in the second reserve hospital.

The fever lasted five weeks and terminated by lysis; the general symptoms were severe but there was no rash or enlargement of the spleen.

Blood examinations gave negative reactions for typhoid, paratyphoid A and B and undulant fever, but positive results with *B. colombensis* in dilutions of 1/40 to 1/160 and the same bacillus was isolated from the faeces. The irregular reactions with lactose were noticed as described for the type species.

P. W. B-S.

DENGUE.

GOLDSMID (J. Albert) & CROSSE (Walter). **Some Notes on Dengue.**—*Med. Jl. of Australia.* 1916. May 6. Vol. 1. 3rd Year. No. 19. pp. 377-378.

CLELAND & BRADLEY. [Discussion on Dengue.]—*Ibid.* pp. 386-387.

(1) The authors describe an outbreak of an intensely contagious fever which occurred at Murwillumbah, New South Wales. This was probably introduced by soldiers from the military camp at Brisbane and was originally believed to have been measles. On 10th February, 1916, it was first definitely diagnosed as dengue and from that date it spread widely, practically to every resident in the town, attacking most of the inmates of houses and hospitals. The onset was always sudden; the fever, which ran high, lasted from four to seven days and was accompanied by a flushed face, headache, insomnia, some delirium, pains in the back and limbs, a relatively slow pulse, and eruptions both initial and terminal. The former was evanescent, fine, and punctate; it was present on the elbows and knees and was also found on the mucous membranes of the mouth; the second eruption was polymorphic, papular or dark red and blotchy, occasionally urticarial. There were no severe complications and there was no mortality.

(2) Dr. B. Cleland visited Murwillumbah and collected both *S. fasciata* and *C. fatigans* mosquitoes there; these he fed on himself at Tweed Heads and at Sydney. Seven days after he had been bitten he developed dengue. These mosquitoes had fed on patients at Murwillumbah and were allowed to bite persons at Sydney, none of whom contracted the disease. From his experiments he thought that the incubative stage could be put down as seven days, that the disease was conveyed by *S. fasciata*, and that it was a mutant from yellow fever, differing from the typical dengue of Syria in the long incubative period, the slowness of the pulse, and the infection being carried by a *Stegomyia*.

Dr. C. H. Bradley utilised for inoculation purposes the blood of infected persons brought to Sydney by Cleland. The filtered citrated blood from one case gave negative results in five trials; unfiltered serum from a second case gave one negative result. Two subjects received injections from the clot on the 8th April, and injections of serum or citrated blood on the 12th of April from dengue cases in the Sydney Coast Hospital. The disease declared itself on the 16th April. Five others were also inoculated with the same material from the Coast Hospital and none of them developed the disease; therefore, he states, seven days would be the incubative period.

In the discussion which followed it was pointed out that it is unusual for the incubative period of specific diseases when conveyed by direct blood inoculations and by insect infections to be the same, and that the date of infection by mosquitoes in Dr. Cleland's case was uncertain as he had been bitten several times; the blood inoculations were also complicated by two different methods being used on separate occasions for the same cases, therefore the period of incubation could not be fixed by these experiments.

[There is little doubt that the epidemic was one of true dengue and that it was spread by mosquito carriers. The slow pulse has been noticed often by others in endemic areas, particularly in that form classed as seven day fever, and this epidemic links up in a remarkable manner the seven day fever of ROGERS with true dengue. The suggestion that the fever was a variant of yellow fever is not sufficiently supported by the evidence to warrant it being brought forward.]

P. W. B-S.

MEAGHER (Edward T.). *On Dengue. Referring to an Epidemic at Bermuda.*—*Jl. Roy. Nav. Med. Serv.* 1916. Apr. Vol. 2. No. 2. pp. 188-190.

In the summer of 1915 there was a widespread epidemic of dengue at Bermuda, commencing in August and disappearing in October, the period of the hottest time of the year when mosquitoes were very numerous. It is stated that about half the total population, irrespective of colour, age and sex, was affected, but on board men-of-war visiting Bermuda the incidence was only about three per cent. The type of the disease was mild, the rash being often absent, but headache and pain in the eyes and back were always noted. H.M.S. "Cumberland" was in dock or alongside for 20 days; from her the author records seventeen cases or $2\frac{1}{2}$ per cent. of her complement. All but one case occurred within a few days of sailing, but this man did not develop the disease until twenty-three days after leaving Bermuda. As the incubative period of dengue is six days, the etiology of this case is discussed and it is noted that mosquitoes were found on board for two or three weeks after leaving Bermuda and may have conveyed the infection from the sick to the healthy, but it was curious that none of the sick berth staff or others in close proximity to the patient developed the disease from him.

[As the last case developed the disease 23 days after leaving Bermuda and mosquitoes were only noticed for three weeks at sea, it is probable that the absence of further infection was because there were then no "carriers" present in the infective stage of the disease.]

P. W. B-S.

VINSON (L.). *Etude sur l'épidémie régnante dite de Dengue.*—*Bull. Soc. Med. de l'Île Maurice.* 1915. Apr.-Dec. Vol. 33. 2nd Ser. No. 40. pp. 19-22.

In the winter of 1914 an epidemic classed as dengue was very prevalent in Mauritius. It was chiefly present in the higher parts of the island, the natives and those living in the coast towns and districts being but little affected. At Molka the author and members of his household contracted the disease, not all simultaneously, but in small groups of two or three. The symptoms however were so peculiar that the diagnosis of seven day fever was made. The differential characters of the two diseases, as given by ROGERS, are tabulated. In the Mauritius epidemic, the regularity of the fever, lasting generally six to eight days, associated with a relatively slow pulse, absence of severe articular

pains, rapid recovery, and freedom of chronic complications, was unlike what is generally found in true dengue. The disease was very contagious, attacking all ages and sexes indifferently.

Regarding the means of infection it was noted that in families living in the higher endemic regions, the only ones who escaped were those who during the day were employed in the town and returned home at night, this indicating a day-biting mosquito as the carrier.

P. W. B-S.

PAPPATACI FEVER.

RAGAZZI (Carlo). *Febbre de pappataci in Bengasi.—Malaria e Malat. d. Paesi Caldi.* 1916. Apr. 20. Vol. 7. No. 2. pp. 90-96.

The author during a study of the fevers occurring at Bengasi (Berenice) noted the occurrence of epidemics there of a short benign type which he recognised as phlebotomus fever. In 1856 and 1879 these fevers were classed as dengue or influenza and locally known as "Budabbus." In 1915 there were numerous cases with slight fever lasting generally two or three days and called gastric rheumatic fever. Two cases are described in detail. The first was typical, the second presented some characters of an irregular form of undulant fever but gave a negative serum reaction, the rheumatic pains and subsequent asthenia favouring this diagnosis. [Though two to three days is the usual duration of phlebotomus fever prolonged cases have been described by SPAGNOLIO and others.] The disease was possibly conveyed by *P. minutus* var. *Africana* which frequently feeds upon the blood of a gecko, *Tarentula mauritanica*, found in the locality.

P. W. B-S.

MONTEFUSCO (Alfonso). *La febbre del tre giorni a Napoll.—Riforma Med.* 1916. Jan. 31. Vol. 32. No. 5. pp. 120-122.

During November of 1915 a number of cases of fever occurred in 208 Battalion stationed at Granili, in which the diagnosis was difficult, these cases being variously described as rheumatism and influenza, but a certain number were definitely "three-day fever" forms, and due to infection by *P. papatasi*. The leucocytic formula of these was described as, Polynuclears 58 per cent., Eosinophiles 3 per cent., Mononuclears 13 per cent., Lymphocytes 20 per cent., Transitionals 6 per cent.; this constitutes a criterion of much importance in the diagnosis.

P. W. B-S.

RAT BITE FEVER.

FIEVEZ (J.). *Un Cas de Sokodu (Septicémie éruptive par morsure de rat) observé dans la zone des armées.—Paris Méd.* 1916. Apr. Vol. 6. No. 16. pp. 388-391.

The author describes in detail the case of a woman who was bitten by a rat in a village on the Meuse. The bite was on the left shoulder and the initial wound healed rapidly, but after an incubative period of fourteen days it was followed by inflammation at the site of the wound, which became ulcerated; lymphangitis was severe and the

glands were swollen. At the same time a generalised papulo-cutaneous eruption appeared, associated with marked fever and intense sweats. A week after this had passed off there was a second paroxysm but without fresh eruption, though the old one reappeared. A third abortive attack was noted, followed by complete recovery. No specific treatment was employed and attempts to obtain laboratory cultures from the serum of the papules failed.

P. W. B-S.

TILESTON (Wilder). The Etiology and Treatment of Rat-Bite Fever.—
Jl. Amer. Med. Assoc. 1916. Apr. 1. Vol. 66. No. 14. pp. 995-998.
With 4 figs.

The author describes a typical case of rat-bite fever which was admitted into the New Haven Hospital. During the paroxysms of fever he was able to demonstrate in the blood by dark ground illumination streptothrix like organisms 9 to 20 μ long, similar to those described by SCHOTTMÜLLER and BLAKE. They were also stained with difficulty but inoculation into animals was unsuccessful. The organisms were non-motile and always disappeared from the blood between the attacks. Treatment with Fowler's solution had no apparent effect but an injection of salvarsan immediately cut short the fever, which did not return. A second case was also treated with salvarsan, followed by prompt recovery, but in this one blood examination gave negative results, probably because the blood had not become invaded by the organism.

P. W. B-S.

TUNNICLIFF (Ruth). Streptothrix in Bronchopneumonia of Rats, Similar to that of Rat-Bite Fever. (A Preliminary Report).—
Jl. Amer. Med. Assoc. 1916. May 20. Vol. 66. No. 21. p. 1606.

This article is of considerable interest in that it supports the view that has lately been brought forward by American investigators that rat bite fever is caused by a streptothrix [see this *Bulletin*, Vol. 7, p. 160].

The author examined sixty rats showing signs of acute or chronic broncho-pneumonia and in smear preparations of fifty-six Gram-negative streptothrix organisms were found. By dark ground illumination, cork-screw like movements were observed, and with Levaditi's method of impregnation spiral forms were seen in the tissues. From twenty rats similar organisms were cultivated and in thirteen of these the culture was pure, the medium used being human blood agar, or ascitic goat blood agar; the optimum temperature for growth was 37° C. Young healthy rats injected intraperitoneally show acute lesions in the lungs, and the same organism was isolated from the heart blood. The organism appears to be similar to that which was isolated by SCHOTTMÜLLER, *S. muris ratti*. The Levaditi specimens are very like those shown by FUTAKI and described by him as a spirochaete. "As the trachea of infected rats is full of mucus containing large numbers of the organisms it is readily seen that a bite from such a rat might be infectious."

P. W. B-S.

ROCKY MOUNTAIN SPOTTED FEVER.

WOLBACH (S. B.). **The Etiology of Rocky Mountain Spotted Fever.** (A Preliminary Report).—*Jl. Med. Res.* 1916. Mar. Vol. 34. No. 1. pp. 121–126. With 1 plate.

Ticks (*Dermacentor venustus*) infected with the virus of Rocky Mountain Spotted Fever were received by the author from Surgeon L. D. FRICKS of the United States Public Health Service. From both male and female ticks guinea-pigs were infected, and these developed symptoms characteristic of the disease and no difficulty has been experienced in maintaining a series of infected animals.

The essential lesions of spotted fever are found in the vascular system and bacillary bodies, having some of the characters of those described by RICKETTS, were present in large numbers in the endothelial cells of the animals examined; these cells accumulate in the vessel walls and around the vessels and in the lymphatics. The organisms are diplo-bacillary in character and show polar staining, but the colouration with Giemsa stain is not that commonly seen with most bacilli and indicates that the organisms have some of the characters of spirochaetes; in stained tissues this peculiarity is most marked. The organisms are also abundant in the muscle cells of blood vessels. All attempts at cultivation have so far failed. The technique employed is fully described and photo-micrographs are given showing the diplo-bacilli in situ.

P. W. B.S.

MICHIE (H. C.) & PARSONS (H. H.). **Rocky Mountain Spotted (Tick) Fever; Report of an Investigation in the Bitter Root Valley of Montana.**—*Med. Record.* 1916. Feb. 12. Vol. 89. No. 7. (Whole No. 2362.) pp. 265–277. With 2 maps & 2 charts.

In this most interesting paper the authors review our whole knowledge on the subject and give the results of a most careful study of the disease, which extended over a period of more than two years. Laboratory methods were extensively used. The disease is of a very restricted endemic character and is undoubtedly conveyed by ticks, which abound in the spring and summer seasons, but they were unable to confirm the view propounded by WILSON, ANDERSON and CHOWNING, that it was due to an intra-cellular piroplasm (*P. hominis*) nor that of STILES, ASHBURN, and CRAIG that the cause was a trypanosome; the causative agent being yet undiscovered. There is evidently some difference in the Montana and Idaho strains of the infective organism, as in the former cases the mortality is about 3 per cent., and in the latter 75 per cent. There is no doubt that the infective agent is in the salivary glands of the tick (*Dermacentor venustus* and *D. modestus*) as shown by RICKETTS, and is conveyed by the bite of these ticks, but for a successful inoculation the minimum time with a guinea-pig was one hour and forty-five minutes, and it requires twenty-four hours for a normal tick to become infected from a guinea-pig suffering from the disease, important points to remember when considering prophylaxis. No race, age, or sex is immune and no case of chronic spotted fever in man is known; one attack gives complete immunity and the young of immune female guinea-pigs possess a certain amount of immunity.

A full description of the symptoms is given. The disease is characterised by sudden onset, continued fever, enlarged spleen, early albuminuria, slow pulse, pain in the head, neck, back, and joints, and a characteristic eruption. The diagnosis has chiefly to be made from typhus fever. The virus is contained in the blood during the febrile period only, and is present in the red cells, white cells, and serum; it is also found in the liver and spleen. After death the internal organs are markedly congested; haemorrhages and patches of gangrene are often present. For treatment immune serum from horses has not given encouraging results and atoxyl and salvarsan are worse than useless, but the authors found that a sodium citrate solution was useful for animals; they were not able to test it on man. They suggest that sixty cc. of a 5 per cent. sterile, freshly prepared solution should be given intravenously. For prophylaxis the inhabitants of infected districts should be taught the method of transmission by the tick and to discredit all other suggested means, and every effort should be made to destroy the ticks. Two cases are described in detail and there is a full list of Bibliographic references.

All interested in the disease should study the original paper.

P. W. B-S.

FRICKS (L. D.). **Rocky Mountain Spotted Fever. A Report of Laboratory Investigations of the Virus.**—*U.S. Public Health Rep.* 1916. Mar. 3. Vol. 31. No. 9. pp. 516-521. With 1 fig.

It has been proved that the virus of Rocky Mountain Spotted Fever is present in the peripheral blood, is conveyed by ticks (*Dermacentor*) and their progeny, and that guinea-pigs and white rats are susceptible. Various organisms have been found in the blood and have been described as the possible cause, but none have been sufficiently confirmed. The Public Health Service has taken up the study and many investigations have been carried out in the field laboratory at Victor, Mont., and at Washington. All attempts to cultivate the virus aerobically have failed, but ten strains of anaerobic bacilli have been isolated; these however are not pathogenic to guinea-pigs and are not agglutinated by immune guinea-pig serum. They resemble closely the organisms isolated from typhus fever blood by HASSELTINE and NEILL and that isolated by PLOTZ under the name of *B. typhi exanthematici*. The technique employed in the present research to grow the virus anaerobically is described and the apparatus is figured. Forty-seven cultures were made and ninety-seven guinea-pigs were inoculated; the cultures were from two days to one month old when used. Three guinea-pigs out of ten, inoculated with cultures 21-25 days old, either showed definite lesions of spotted fever or were immune, and from these experiments it is concluded that a multiplication of the virus occurred in the cultures. By centrifuging the serum under special conditions the author was able to cause infection of a guinea-pig with three drops of the sediment, the supernatant fluid being harmless. Microscopical examination of the infected guinea-pig's blood showed chromatin bodies both in the red blood cells and the plasma; the intracellular bodies resemble those described by SEIDELIN in yellow fever blood and are believed to be protozoal in character, but no definite conclusions can at present be arrived at with regard to their etiological significance, further research being required.

P. W. B-S.

SMITH (M. H.). **Rocky Mountain Spotted Fever treated with Adrenal Secretion.**—*Med. Record.* 1915. Oct. 2. Vol. 88. No. 14. [Whole No. 2343.] p. 568.

The author, who writes from Basin, Wyoming, was led to try this treatment by the views expressed by SAJOUS in his "Internal Secretions and the Principles of Medicine." Three cases were subjected to treatment. The symptoms and details of treatment are shown in a table. In two cases calcium was also used. All recovered. The author states that the febrile disturbance was shortened. The normal death-rate is not stated.

A. G. B.

VERRUGA PERUVIANA.

TOWNSEND (C. H. T.). Identification of the Stages in the Asexual Cycle of *Bartonella bacilliformis*, the Pathogenic Organism of Verruga, and their Bearing on the Etiology and Unity of the Disease.—*Jl. Washington Acad. Sci.* 1915. Dec. 19. Vol. 5. No. 21. pp. 662-667.

The author takes it as proved that a species of *Phlebotomus* (*P. verrucarum*) is the transmitter of both Oroya fever and verruga, which exist endemically in Peru, and that these are stages of the same disease. Almost every investigator has recognised the minute bodies in the red blood cells of the fever patients and has failed to find them in those suffering from the eruptive condition. The small bodies described by DARLING as seen in the red cells and called by him X bodies are recognised by the author as immature gametes; the Leishmania-like bodies described by GASTIABURU in verruga eruption tissue and in the liver of verruga patients as early and maturing schizonts, and the "cell inclusions" of MAYER and ROCHA-LIMA found in the vascular endothelial cells of verruga nodules, are maturing *Bartonella* schizonts and merozoites due to the breaking up of the schizonts. These according to the author are different stages of the same parasite. STRONG has shown that the evolution of the organism of Oroya fever takes place in the endothelial cells of the small blood vessels, but he failed to connect these organisms with any of the bodies found in verruga tissues, as claimed by TOWNSEND, and the whole hypothesis whether the two conditions are one and the same disease hangs upon this identity. The author postulates that the sporozoites are introduced into the blood by the *Phlebotomus*; these find their way into the vascular endothelial cells, becoming schizonts, and pass through the unruptured walls of the infected cells into the red cells which come into direct contact with them; the rods and ovals seen in the red cells are the male and female gametes which can conjugate only in the *Phlebotomus*, the fever stage corresponding to a heavy infection of the red cells. The eruption, when there is a great proliferation of the vascular endothelial cells, is due to extensive asexual multiplication of the parasite in the subcutaneous tissues, and the absence of the parasites in the blood cells is due to the proliferation of the cells preventing the red cells coming in contact with those ones containing merozoites, so the fever subsides and the gametes are no longer in the circulating blood. As the red cells can only become infected while in direct contact with the infected endothelial cells in the capillary walls, so the implantation of verruga eruptive tissue acts only as a local irritant or graft, the subsequent cell proliferation being due to a toxin and not to a virus introduced.

The internal eruptions (*denied* by STRONG) are due to the sporozoites carried by the lymph stream, which have failed to embed themselves in the subcutaneous tissues.

The author states that the fever and eruptive stages correspond very generally in intensity, but when this is not marked it is due to the production of antibodies cutting short the asexual multiplication of the parasite in the subcutaneous tissues.

[The pathological and histological findings are of great interest and importance, but the crux of the question lies in the transference of one or both diseases to animals and the immunity conferred. These so far point to the duality of the diseases.]

P. W. B-S.

TOWNSEND (Charles H. T.). Note on the Etiology of Verruga as deduced from a Study of the Asexual Stages of Bartonella.—*Jl. Parasit.* 1916. Mar. Vol. 2. No. 3. pp. 143-144.

This is an abstract of a paper read before the Second Pan-American Scientific Congress in January 1916, in which the author describes his recent researches on the etiology of verruga. His belief in the identity of Oroya fever and verruga is consistently maintained, but the hypothesis of the method of production of the verruga lesion by means of the toxic action on the endothelial cells of a generative stage of the Bartonella parasite requires more support and confirmation. The original paper will be looked forward to with interest.

P. W. B-S.

TOWNSEND (C. H. T.). Recent Questioning of the Transmission of Verruga by Phlebotomus.—*Bull. Entom. Res.* 1916. Feb. Vol. 6. Pt. 4. pp. 409-411.

This is a very controversial expression of the author's views, which have been criticised in the Report of the First Expedition to South America, Harvard School of Tropical Medicine, by STRONG, TYZZER, SELLARDS, BRUES, and GASTIABURU [see this *Bulletin*, Vol. 7, p. 73]. It contains no new facts and both his papers and the reports of the Harvard Expedition have been previously dealt with in this *Bulletin*. The author states that the Reporters "declined to visit with him at night the infected zone (Verrugas Canyon) and that they collected no insects that have any bearing on the transmission of verruga." He finds no evidence that either mosquitoes or ticks transmit the disease, the vector of which must be a nocturnal blood sucker, abundant in the wet season but never absent all the year round, and that the *P. verrucarum* is the only species that meets these requirements.

P. W. B-S.

TROPICAL DISEASES BUREAU.

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[No. 5.]

APPLIED HYGIENE IN THE TROPICS.

By COLONEL W. G. KING, C.I.E., I.M.S. (Retired).

REPORTS.

THE INDUSTRIAL SCHOOL, ONDERNEEMING, BRITISH GUIANA.

Reformatory or Industrial schools are factors in the sanitation of communities of no mean importance, and should afford a large scope for study of Eugenics.

In a Report on a school of this character (Onderneeming) to the Government of British Guiana the Superintendent, Mr. G. H. BAYLEY, gives interesting information as to financial management, and shows how in attempting to improve the moral and physical condition of the young criminal, it is also possible to utilize his labour for the benefit of the State. In regard to the latter aspect of the matter, it would be inappropriate in this *Bulletin* to do more than indicate that, with the labour at disposal, the Superintendent has been able to conduct numerous experiments with plant growth and animal stock breeding, of economic importance in British Guiana. As to general health, Mr. Bayley reports that this "can only be described as fair, the daily average of sick having been 5.6 per cent." But he adds the following complimentary allusion to the Medical Officer in charge:—

"The average percentage sick during the months April to July was 9.5 as compared with 2.4 during the closing months August to December. This improvement is, I think, to a large extent attributable to the skill, care and attention which Dr. Sholto Douglas has devoted to the institution since his assumption of duty as Medical Officer in August."*

Tables are given for ten years showing, at ages, the mean rates of annual increase in height as well as weight. Unfortunately, these heights and weights are not identified with races, but are the product

* Report on the Onderneeming Industrial School (British Guiana) for the Nine Months, April to December, 1915. 1916. Georgetown: "The Argosy" Company Ltd.

of measurement of a mixed population which, in 1915, was as follows — Black Creoles, 74·8 ; East Indians [natives of India], 11·81 ; Portuguese, 3·15 ; mixed races, 9·45 ; Aborigines, 0·79 p.c. Nevertheless, the figures, as follows, may be of utility in making comparisons with other known results :—

Age.	Height. Mean Rate of Annual Increase. Inches.	Weight. Mean Rate of Annual Increase. lbs.
10	1·6	5·7
11	1·8	6·1
12	1·9	7·1
13	1·9	8·6
14	1·9	9·3
15	1·9	10·1
16	1·6	10·1

No statement is furnished of the diet of the boys in this school, and it may well be that, granting it was liberal in total constituents, no inimical influence is likely to be noted in future ; but, if the balance was likely to be upset easily, the following statement may be of future interest as to this school :—“ In the interests of economy, corn bread has been substituted for wheat bread in the inmates’ diet.”

As to physical fitness the following statement is made :—

“ The work of the boys on the whole has been very satisfactory. Comparisons with free labourers which are often made, prove that the bigger boys who are exempt from further school work, and labour in the fields eight hours per day are easily able to perform in that time as large a task as the average free labourer gets through in one day.”

Fiji.

Dr. H. MACDONALD, Rotuma, Fiji, in his Report* gives a condensed account of useful sanitary work performed by him as a District Medical Officer :—

“ *General Sanitary Work.*—A good deal of sanitary work was done, the details of which are noted in the Medical Officer of Health’s journal here and will be given more or less in my report as Medical Officer of Health. All villages have been visited during the year, and their sanitary condition noted. Latrines, water tanks, kitchens, houses, cemeteries have been visited, punts and boats inspected, schools and dormitories measured and the attention of those in charge of them drawn to deficiencies in cubic space where such deficiencies existed. Advice has been given to the phthisical as to sputa and an endeavour has been made to isolate them as far as possible. All lepers have been removed to Makogai during the year and the bush-huts they resided in burnt. At the close of the year all concrete houses—the majority of the houses here are concrete—were white-washed inside and out, and all water tanks were scrubbed out. Bye-laws regarding privies and the prevention of the breeding of mosquitoes were framed and passed and are now in force. Bye-laws regarding dwelling-houses were also framed and sent in for approval.”

*Annual Medical Report, 1914, Council Paper No. 23, pp. 14–15.

DISEASE PREVENTION.

MALARIA.

The Anti-Malarial Zone.

It has always seemed to the writer that one of the most practical results which should follow mosquito-work by Ross would be a definite statement as to what distance from a source of malaria habitations might be placed, or, in terms adapted to the present etiological requirements, as to what is the flight of anophelines; for, *upon the answer to this query, depends the practicability of most anti-malarial measures and their cost.* Considering the number of years that has elapsed since the mosquito was convicted of being the malaria bearer, and the amount of refined entomological work fulfilled as to this particular insect, it is extraordinary how little attention has been given to this eminently practical point. There were certainly difficulties in the way. It is not always easy to determine that mosquitoes have no rendezvous beyond the pools known and under treatment. Strenuous search may detect in an apparently dry and scorchingly hot sandy waste, by some freak of subsoil formation, a mere basin full of water with that gentle renewal of clean contents under pressure that is the special delight of the prolific anopheles; and, hence, calculations of distances between the nearest possible pool and habitations have been liable to error.

CELLI ("Malaria," by Angelo CELLI, 1900, p. 246) in the light of possible mosquito flight, held that a protective zone from the influence of irrigation should be from 2 to 3 kilometres. He also quoted statistics showing that the apparent influence of rice fields extended to an extreme of from 4,000 to 5,000 metres, and that in a radius of 300 to 400 metres the danger was imminent.

With the knowledge of ancient Italian legislation efforts, and aided by a clear history of introduction of malaria fever following excess water for irrigation, in the formerly healthy locality of the head quarters of the Kurnool District, the writer secured in 1881 a protective zone of *one mile radius* for that town. Considering the absence of removal of complete facilities for mosquito-breeding (then of course unknown) the results were excellent. In adapting the one mile standard, the writer depended on the evidence of DEMPSTER (of splenic index fame) when on a committee regarding the limitation of irrigation in the Peshawar Cantonment. His opinion, with that of his medical co-signatories, was embodied in a note, which is well worth repeating in the light of the modern etiology of the disease:—

"The distance which secures safety from the effects of malaria varies according to certain circumstances, some of which can only be accurately ascertained after considerable experience. With such a stiff clayey soil and with such facility of swamping as the land which exists in the neighbourhood of Peshawar, we consider two miles a prudent distance, but one mile at least is in our opinion essential to safety under such conditions as there present themselves; unless when any part of the City may intervene* between the malarious locality and the ground occupied by the troops. According to almost universal experience, there is no more ready way of generating malaria in such a climate as this than by profusely irrigating a

* See note *re* Malaria, p. 353, Vol. 3, of this *Bulletin* (Sanitation Number) 1914. April 30.

stiff retentive soil, and, therefore, we believe it imperative not only to prohibit all Canal irrigation within one mile of the Cantonment pillars, but to take steps for securing the perfect drainage of the space included within this line."* [Italics not in original.]

In 1888, the writer secured for the inhabitants of a hamlet (situated on land irrigated to the doors of the huts) practically decimated by malaria, a new elevated well drained site, free from jungle for a mile, with a protective zone of only 250 yards from irrigation. The zone was of necessity a compromise, and it was feared complete protection might not be secured; the result was however excellent. In 1908, STEPHENS and CHRISTOPHERS ("Practical Study of Malaria," p. 183), stated:—"In the case of the above species [*Mym. culicifacies*, *Nyss. Stephensi*, and *Nyss. fuliginosus*] they undoubtedly fly fairly readily a quarter of a mile, but half a mile appears to be beyond the normal distance of flight."

In 1909, Major GOOD, I.M.S., reported officially to the writer, on good grounds, the three-quarter mile flight of anopheles from the only available pool at Magok, Burma. In the *British Medical Journal* (1913, May 24, p. 1136) Captain T. C. McCOMBIE YOUNG, I.M.S., shows that after the treating by kerosene of possible pools, invasion by mosquitoes occurred from $1\frac{1}{2}$ miles distance "on a gentle breeze." SHIPLEY, in the *British Medical Journal* (1915, January 16, p. 106) also discusses this important matter.

Malcolm WATSON (p. 65 "The Prevention of Malaria in the Federated Malay States") has afforded excellent evidence to show that the grade of safety increases, according as the distance from sources of mosquito propagation increases. He found that whilst within 300 yards of *undrained* jungle the spleen rate was 47 per cent., at 1,000 yards it diminished to 2.6 per cent. Major FRY, I.M.S., found at the edge of undrained jungle the spleen rate was 59 per cent. but, at 200 yards distance from it, there was a decline to 23 per cent. and, at one mile from it, the spleen rate was *nil*.

Such data tend to secure definite ideas, but it has remained for the sanitarians of the Panama Canal to give opinions on the subject founded upon more direct evidence. Mr. ZETEK, one of the subordinates of Mr. Le PRINCE (the Chief Sanitary Inspector) evolved a method of staining captured anopheles with aniline dyes, by use of a fine spray. Special arrangements were made for their recapture, after allowing freedom for flight. Twenty-four so treated were found at from 4,000 to 5,000 feet, and five at 6,250 feet distant from the site of their release. Of the latter, four were *Anopheles tarsimaculata* and one *Anopheles albimanus*. Summing up his experience generally Mr. Le PRINCE holds that these chief malaria bearers at the Panama Canal, where their breeding was prolific, were able "to travel from a half-mile to one mile to reach houses."

The following are quotations from "Sanitation in Panama," by Surgeon-General GORGAS, which give a fair idea of the value of distances as ascertained in practice:—

"The Zone extends for five miles on each side of the Canal, that is, a strip ten miles broad and fifty miles long. Most of the population was

*Note by the Medical Members of the Committee on the necessity of prohibiting canal irrigation within certain limits of the site of the new cantonment [about 1863].

located on each side of the Canal, within about a mile of its axis, while few houses and cabins were scattered through all parts of the Canal Zone.

"Sanitary work, generally speaking, was done only within a mile or so of the Canal itself. All brush and undergrowth were cleared within two hundred yards of houses and villages, and the ground carefully drained within the same area. There was no object in carrying sanitary work beyond the populated area. Even if mosquitoes bred where no human beings were living, no harm would be done, as there would be no one to infect. . . .

"Against malaria he [Sanitary Inspector] had a sufficient number of labourers under one or more foremen, according to the size of the district, who cut the brush and undergrowth within two hundred yards of all villages, houses and dwellings, and who also cut the grass within this area whenever it reached a foot in height. . . .

"The anopheles, the malarial mosquito, is not a mosquito of strong flight; two hundred yards is in general, a good long flight for her. If there were trees and shrubs and bushes every few yards, the anopheles mosquito might travel very long distances and not be much exposed to either the sun or the wind. But if an area of two hundred yards around each building is kept clear, she will not often be able to cross such a zone without destruction, either by sun or wind. . . .

"The drainage was, of course, very much more extensive in area than the grass and bush cutting, for not only had the cleared zone itself to be drained, but all the area within that zone, and also the water-courses leading off from the drained areas had to receive attention. Many times we found that anopheles were breeding very much beyond the two-hundred-yard limit and still coming into the village. In one case we had a very large flight of anopheles which lasted for two or three weeks, and they were found to be breeding more than a mile from the village of Gatun. So, as a matter of fact, our work was very many times carried beyond the two-hundred-yard zone."

At page 23 of the Annual Report of the United States Public Health Service for 1915, it is stated in describing anti-malarial methods:—"The work should extend, for practical purposes, a quarter of a mile or more beyond the corporate limits or bordering residences to be benefitted."

Anti-Malarial Measures in India.

The fact that the Agricultural Department of India is now urging the importance of soil drainage as an agricultural measure will, in the near future, secure for that country more adherents to that method as an anti-malarial measure than in recent years. In the absence of knowledge of the connection of the mosquito with the etiology of malaria, doubtless efforts made in the past were incomplete—but they were by no means devoid of influence. Hence, at the present time, as it would seem to be forgotten that India can supply illustrations of utilization of drainage as an anti-malarial measure, the following extract from a Report by Surgeon Captain DYSON, I.M.S., in 1892, when Deputy Sanitary Commissioner, Punjab, is of interest:—

"Previous to the year 1868, reports were rife that the villages irrigated by the Western Jumna Canal were being severely water-logged, and that, in consequence, the population was dying out, and the land falling out of cultivation. So grave were these rumours that, in the year 1868, Dr. Adam Taylor, then Civil Surgeon of Delhi, was deputed to inspect certain selected irrigated villages regarding their health. . . . He used the existence of an enlarged spleen as evidence of the ill-health of the people. . . In consequence of his report, large portions of the Western Jumna Canal were re-aligned, and drainage schemes were put in force. In the year 1892, the Punjab Government was anxious to ascertain whether these

measures had effected any material improvement in the condition of the inhabitants of the canal area. In consequence, I was directed by the Government to carry out an enquiry in the same villages as those inspected by Dr. Taylor and on the same lines. . . . In carrying out these investigations the spleen test was used; in each village 20 adults and 20 children were examined for the existence of enlarged spleens. In large towns, 50 adults and 50 children were examined in each quarter. . . . The size of the spleen was registered under the following heads:—

1. Very large=extending across the median line.
2. Large=extending to the median line.
3. Medium of the five classes.
4. Considerably enlarged.
5. Slightly enlarged=*i.e.* could be felt under the ribs.

“Dr. Dempster was the first person to select, in the year 1845, the existence of an enlargement of the spleen as the indicator of the amount of malarial disease existing in the locality, and Dr. Taylor and myself also followed his practice. . . . Though the re-alignment of the canal has done much to improve the health of the population yet the system of surface and deep drainage has also greatly contributed to this improvement. The Western Jumna Canal area is now lined with shallow surface drains connecting one village jhil (or pond) with another and ending in deep sub-soil drains. All deep and large village ponds are being drained, so that they only contain sufficient water for the use of the cattle during the hot weather and no more. Large areas of ground which used to be occupied by sheets of water are now dry and brought under cultivation. . . . A typical instance of the great improvement produced by drainage may be noted in the case of Mehmúdpur, in the Rohtak district; of this village Dr. Taylor writes:—‘Take Mehmúdpur, here 52·5 per cent. show an amount of malarial disease, the causes of which can be appreciated at a glance: a huge swamp filled with alligators and waterfowl runs to the walls of the village, the water in the wells is not a foot below the surface; great complaints of sickness were made. This village has been thoroughly drained since the swamp has disappeared, and its place is now occupied by crops, and the spleen percentage has dropped from 52·5 to 22·5. . . . I venture to think that there can be little or no doubt that the Western Jumna Canal undoubtedly exerted in former times a most baneful influence on the health of the population. It is, therefore, a matter for congratulation that this evil was recognised, and steps promptly taken to ameliorate the condition of the people. That the remedies applied have exerted a most beneficial effect can be recognised by a glance at the returns showing the results in the examinations of 1868 and 1893. . . .’”

Average percentages of persons found to be suffering from enlargement of spleen in villages inspected by both Dr. Taylor and Dr. Dyson* :—

AREA.			Percent- ages found by Dr. Taylor.	Percent- ages found by Dr. Dyson.	Increased percent- ages since 1868.	Diminished percent- ages since 1868.	
Karnál District	A.	Canal village	} Re-aligned or drained	45·75	27·25	..	18·50
Delhi do.	B.	do.		50·56	41·11	..	9·45
Karnál do.	C.	do.		35·50	27·86	..	7·64
Karnál do.	D.	do.		37·95	21·82	..	16·13
Delhi & Rohtah & Karnál	E.	do.		34·29	28·64	..	5·65
Delhi & Rohtah	F.	do.		30·28	40·00	9·72	..

* Dr. Dyson examined, in villages grouped A to F, 3,160 and Dr. Taylor 2,880 persons.

Anti-Mosquito Measures.

Progress in Anti-Mosquito Measures, Port of Spain. "The number of deaths from malaria in the city and the rate per 1,000 of population have steadily declined, within the past ten years, from 71 deaths and a rate of 1.25 in 1905-06 to 39 deaths and a rate of 0.61 in 1914-15. A very careful and exhaustive mosquito survey within the City limits and their surroundings was made recently, when some anopheles breeding grounds were brought to light which were promptly dealt with where possible, and suitable measures of correction now in progress were recommended in other cases; it may be asserted with confidence, I think, that Port of Spain itself is free from dangerous anopheles mosquitoes, and that practically all cases of malaria that come under notice there are imported."*

Queensland.—After deprecating diminution of anti-mosquito measures, the Commission for Public Health, Queensland† states:—

"It is now more than ever necessary that the full squad be re-engaged, as malaria may at any time be brought to Queensland by returning members of the military and naval forces garrisoning the Empire's recently acquired colonies, situated in the South Pacific, and where malaria at present exists.

"Moreover, the question of yellow fever . . . can only be dealt with by active mosquito operations. Now that the Panama Canal has been opened, the danger of this disease gaining admission to this State must not be lost sight of, and it is desirable that the necessary means be placed at the Department's disposal to deal with the question. It is with reluctance, in view of the present disturbed financial conditions of the world, that any increase of expenditure is recommended, but the matter is of such importance that I feel I would be failing in my duty were I to omit bringing it under special notice."

Anopheles in the United States.

The following is an extract from the U.S. Public Health Service Annual Report for 1915 (p. 21):—"Frederick Knab gives a list of 34 species of American *Anopheles*, of which number 8 have been definitely shown to serve as hosts for the malarial parasite. These are:—

<i>Anopheles albimanus</i> ,	<i>Anopheles pseudomaculipes</i> ,
„ <i>argyritarsis</i> ,	„ <i>pseudopunctipennis</i> ,
„ <i>crucians</i> ,	„ <i>quadrinaculatus</i> ,
„ <i>intermedium</i> ,	„ <i>tarsinaculata</i> .

"The most common species encountered in the Southern States where surveys have been made are *Anopheles crucians*, *quadrinaculatus*, and *punctipennis*. The last named, *Anopheles punctipennis*, is not considered to be a transmitter of malaria. *Anopheles crucians*, according to experiments by Beyer and his co-workers, is said to be a transmitter of the estivo-autumnal parasite only, but this needs confirmation.‡ It is evident from this that *Anopheles* mosquitoes may be present and yet no malaria prevail, and again, the prevailing species may determine the type of malaria. *Anopheles quadrinaculatus* will transmit all three types of malarial parasites, and this species is the one most commonly found in the Southern States where malaria prevails."

*Trinidad and Tobago. Report of the Surgeon-General for 1914-15. p. 11.

†Queensland. Annual Report of the Commissioner for Public Health, to June 30, 1915. p. 8.

‡Recent experiments by MITZMAIN show that this species is infectible with the parasites of benign tertian malaria [this *Bulletin*, Vol. 8, p. 40]. The same worker and N. V. KING have shown that *A. punctipennis* transmits benign tertian in New Orleans [*loc. cit.*].

Trees and Mosquitoes.

In pre-Ross days, the use of a belt of trees as an anti-malarial measure had many advocates. There was however no unanimity of opinion in the matter as to efficacy. By those who found the method of utility, the screen prevented the penetration of air-borne malaria from distant points, and by dealing with excess moisture of soil locally prevented the successful propagation of the malarial germ. The latter was in later years the more usually received theory and, in consequence, trees that required abundance of water for vigorous growth were diligently sought for. Thus by no means undeservedly the Eucalyptus attained fame. The tree however has its limits of endurance in the tropics, and cannot be expected to flourish beyond the cooler heights of hill ranges.

In knowledge of mosquito habits in the present day, the position of trees in the malaria question requires modification. Not only do they afford shelter in the presence of sun-glare for *franc tireur* mosquitoes bred in the neighbourhood, but hollows capable of retaining quantities of water sufficing for their breeding. The following is an extract from the Report of the Department of Health of the Panama Canal for April, 1916, on the subject :—

“ During the month the work of cementing tree cavities was undertaken, as this has been recognised as an important antimosquito measure, but had not been undertaken before in Panama City.

“ In the City, 1,611 trees were treated, plugging such cavities as might become ‘ containers ’ on account of holding water. A cement and sand mixture of 1-4 was used to close the cavities. Where large holes were found pieces of rock were used to fill in, reducing amount of cement needed. Count was kept on about 1,000 trees to determine the number of cavities per tree which during the rainy season would act as water containers with consequent mosquito breeding. An average of 2.55 holes per tree was found, and using this figure for total number of trees treated, we find that 4,108 possible containers were eliminated. The large trees presented the greater number of cavities, naturally, and decayed places where limbs had been broken off, and in the angles formed by branching were to be found the most frequent sites. As many as 22 cavities were found in one tree requiring filling.

“ It is interesting to report that quite a number of the cavities found, even at this season of very little rain, contained mosquito larvae, and larvae from several of these were identified later as *stegomyia*. *Stegomyia* were only found, however, in trees quite close to houses.”

Whilst thus affording shelter and breeding facilities for the mosquito, it would be a mistake to arrive at any axiomatic ruling as to the presence of trees. Each case must be judged by the completeness or otherwise of removal of mosquitoes, and their flight distance from suitable water facilities for breeding. But it is well to remember that the old theory as to removal of excess moisture from the soil is sound. Not only is the transpiration of moisture by trees a factor to be reckoned upon, but the influence of their roots upon neighbouring soil is of direct advantage in securing permeability, and therefore relief of surface drainage. In certain areas, these influences must be of further utility for the same reason in preventing scouring of hollows for pool formation, and in delaying the yielding by the upper layer of soil of moisture to the subsoil flow, and the consequent restraint of sudden heightening of subsoil water—to the peril of water-logging of areas in low levels.

Fish as Larvicides.

The following quotation from p. 15 of the Annual Medical and Sanitary Report, Gambia, 1915, exhibits at once the advantage of "jungle clearing" in exposing otherwise unrecognizable pools, as well as the adaptability of certain species of fish to either brackish or salt water. Unfortunately, the Report gives no indication of the particular fishes employed.

"Clearance of undergrowth has been extensively carried out round the town and in the Old Cemetery. The latter clearing revealed the fact that there were three fresh water lagoons at the western extremity of the cemetery near to the seashore which were swarming with larvae of *Culex*. It was known that at certain periods, and when the wind was in the west or north-west, frequently great swarms of mosquitoes invaded the town, so that it was not unusual to be able to capture fifty to a hundred specimens of *Culex* from one ordinary sized window of mosquito gauze within two or three minutes. The cemetery was suspected of being the culprit and a close inspection revealed the above condition.

"The difficulty arose how to treat these comparatively large expanses of water and it was decided to fish-stock the two largest, about a dozen buckets of small fish obtained from the drains being carefully placed in them. The results were most satisfactory; the fish increased in number and the larvae disappeared entirely. . . .

"The large salt water lagoon in which *Culex thalassius* breeds, referred to on page 14 of the Annual Medical Report for 1914, was stocked with some forty buckets of fish taken from the same drains as the above, with equally satisfactory results. It is of interest to note that these fish appear to be able to acclimatize themselves to either brackish or salt water, and they are of untold value to Bathurst, since they can be obtained for nothing and are voracious eaters of larvae. Constant care is, however, necessary to keep up the stock in the lagoons owing to wastage from predatory birds, such as egrets and kingfishers. Pits dug in the bottom of the pools afford some shelter to the fish."

Larvicide Ducks v. Fishes.

In experiments conducted as part of the anti-malarial operations in the City of Madras, for the quarter ending the 31st March, ducks were given a fair trial as larvicides. It is reported (Madras Government Order No. 1131 M., dated 1st July 1916) that a

"pond was completely cleared of weeds. Ducks were let in for the whole of the day time. They exercised no influence upon the life of the mosquito larvae. This was tried on three occasions at intervals of about three weeks; on each and all the three times no satisfactory results were obtained. . . . The pond in the compound of Branson's bungalow was free from fish, and it was considered a suitable place for putting in ducks. This was done, and the pond was examined every third or fourth day. The mosquito larvae continued to thrive as well as before. This was continued for four weeks and, as no satisfactory results were obtained, the experiments were stopped."

In the same Report, it is stated that a re-survey of 2,247 wells which had been stocked with larvicidal fish was conducted. In only 322 wells, or 14.3 per cent., larvae were found. Fish were found dead in 258 wells or 11.4 per cent.

Mosquito Screening.

The following somewhat indefinite but hopeful description of a new contrivance is given at p. 22 of the Annual Medical and Sanitary Report

for the Colony of the Gambia for 1915 :—" A new form of mosquito protection of tanks has been devised, which entirely avoids the use of gauze at the inlet and outlet of water. It is hoped that this may be adopted experimentally to certain of the tanks before the onset of the next rains."

YELLOW FEVER.

The following is the forecast (p. 13, Medical and Sanitary Report, Gambia, 1915) of possibilities at Bathurst in respect to yellow fever :—

" A total of 622 specimens were taken and examined with, roughly, the following percentages :—

<i>Stegomyia</i>	94 per cent.
<i>Culex</i>	5.5 "
<i>Anopheles</i>	0.5 "

" In view of what is stated on page 15 (' Bush Clearing ') the low percentage of *Culex* breeding in the town is somewhat notable, but the extremely high *Stegomyia* percentage points to the absolute necessity of making a determined campaign against the conditions of mosquito breeding in compounds. Although a commencement has been made towards the extermination of the mosquito in Bathurst, and a certain reduction already effected, the existing state of affairs is only too favourable to the spread of yellow fever if it should gain ground in Bathurst, so no relaxation of our efforts can be permitted."

In this connection, it is worthy of note that at p. 21 of the Report under reference, it is stated that *Stegomyia* are not found in McCarthy Island.

DYSENTERY.

Egypt.—For a considerable period, the profession has recorded the fact that dysenteries are of bacillary and amoebic types with a certain amount of apathy as to sanitary measures; the tendency has been rather to study treatment of these diseases than to investigate the subject of their prevention. The results as to treatment have been brilliant, but as to sanitation practically *nil*. The facts illustrate the writer's contention that whilst laboratories for clinical and pathological work and those engaged in research for preventive medicine should be in free intercourse, their *personnel* and administrative control should be distinct (*vide* this *Bulletin* (Sanitation Number) 1915, June, p. 468).

The occurrence of dysenteries as one of the causes of disablement in the more eastern area of the present war, has doubtless stimulated investigation. Thus, it is found that Sir Ronald Ross, when on service in Egypt, in collaboration with Captain D. THOMSON, R.A.M.C.,* undertook an enquiry as to the duration of vitality of the *Entamoeba histolytica*.

Dysenteric stools were deposited in the ordinary dry sun-baked Egyptian sand in covered trays. The deposits were microscopically examined daily, with the result that whilst, by the third day, in no form was the *histolytica* recognizable, there were present swarms of amoebae and flagellates which were of the same class but, so far, were found to be non-pathogenic; nevertheless, it was thus ascertained that " protozoa of the same class did exist in the sand which

*Proc. Roy. Soc. Med., 1916. Jan. Vol. 9. No. 3 (Sect. of Epidemiol. and State Med.). pp. 33-48.

was dry during the greater part of the year." On Sir Ronald Ross's return to England, further investigation was conducted by Captain David THOMSON, R.A.M.C., and Lieut. Gordon THOMSON, R.A.M.C. In an interesting paper in the *Journal of the Royal Army Medical Corps* of July, 1916, they state, in detail, the results of numerous experiments of a laborious nature. They used the *Amoeba limax* as sufficiently typical of the *Entamoeba histolytica*, but they assert: "We have been careful not to assume because the cysts of free living protozoa are very resistant to external conditions, the pathogenic species must have similar powers. It is likely that the cysts of the latter are more delicate." This work with the amoebae must prove of much future importance, but their remarks conveyed in the June number of the same *Journal* as to the vitality of *E. histolytica* are of present practical importance.

They hold (*Journal of the Royal Army Medical Corps*, 1916, June, p. 692) that infection "undoubtedly takes place by means of cysts, which in some way are conveyed to the mouth and swallowed." They have conducted successful feeding experiments of kittens illustrating the fact. They point to accidental contamination of the food of man by his hands, or by flies; and call attention to the fact that faeces passed in the neighbourhood of a camp in sandy areas are soon intimately mingled with sand, and particles are thus liable to be blown long distances.

It is as the bearer of cysts, therefore, that a dysenteric patient is liable to become a dangerous "carrier." The authors show that treatment by emetine short of sufficient to kill *E. histolytica* expedites the formation of cysts and, consequently, this is a point of the greatest importance in the treatment of dysentery, and, the writer would add, both from a medical and sanitary point of view. To this end, they lay down the rule that "never less than twelve grains of emetine should be given in a continuous treatment of one grain daily."

The importance of the cyst stage is further emphasized by the authors pointing out that it has been proved by many observers that the cysts are infectious when swallowed, whilst Colonel WENYON has shown that the mobile stage of the pathogenic amoeba is not infectious by mouth. Indeed, "the cystic phase is the sole cause of transmission," and these cysts are able, under favourable circumstances, to live for at least a month outside the body.

Not without good cause, as the authors show, is there reason to regard the fly (with the most scanty opportunity of settling upon specifically contaminated faecal matter) as a great factor in spread, but they do not follow the tendency of the day to forget the rôle of water. They state, "with regard to water we have already shown that the cysts can live in it for several weeks, so that drinking water contaminated with faecal sand is a source of infection."

Malaya.—The observers in Egypt are not alone in grasping the importance of further investigation of the dysenteries. Under the Director, Dr. Henry FRASER, the subject has received attention in the Kuala Lumpur Laboratory. The stools of one hundred and twenty-three cases of dysentery were examined. Of these, 44 were amoebic, 67 were non-amoebic, and twelve were not considered to be dysenteric.

The non-amoebic, or bacillary, cases proved specially difficult of study. Dr. Fraser states that, "even after months of practice

dysentery bacilli could only be isolated from about half the cases of non-amoebic dysentery." The conclusion was arrived at that the "dysentery bacillus of Flexner, the bacillus "Y" of Hiss and Russell, and Strong's bacillus are not distinct types." It is advised that these names be abolished. Dr. Fraser holds that, in Malaya, there are two types of bacillary dysentery; the less common is that caused by Shiga's bacillus, the more common is caused by a mannite fermenting bacillus unnamed.

He regards the use of vaccines as likely to give the best results in bacillary dysentery. "By a series of experiments on animals, it was found that strains of these bacilli which had been treated with specific serum were not harmful in quantities which of the untreated bacilli were harmful." He obtained serum from rabbits, which became potent in a month. He gives a description of his method of making the vaccine (p. 42) by adding a serum specific for the organism to a killed culture, the mixture being then incubated for one hour. He shows that it has well justified his expectation. He then adds, "It is probable that, apart from its value as a curative agent, the treatment will confer a higher degree of immunity than that which may be derived from an unaided recovery, and that the tendency to relapses, or recurrences, will be lessened."

Sierra Leone.—Dr. BURROWS, Acting Principal Medical Officer, in his Report for 1915, states that one of the outstanding features of the past year was the unsatisfactory condition of health in the jail of Freetown.

Dysentery and diarrhoea prevailed to an undesirable extent; on an average strength of 258 prisoners, there were 63 admissions under the former, and 41 under the latter head. From all causes, the total deaths were at the very heavy rate of 108.5 per mille. The Medical Officer in charge of the jail states:—

"The Sanitary condition of the prison is good. The yard has been macadamized and a new drain which bears off all surplus water during the rains. A new cooking apparatus has been ordered, and a suggestion that the new enlarged kitchen should be made fly proof has been approved."

A Medical Committee which considered the subject of ill-health held that the sanitary condition left nothing to be desired, that the food was abundant, varied and well cooked, but advised an addition of limes and tomatoes. As to water supply, they concluded, "as all drinking water is boiled there can be little or no risk of infection from this source."

The dysentery was in the majority of cases of amoebic type. The precautions taken of boiling the water and the future fly-proofing of the kitchen are obviously in the required direction, and the results should be of sanitary interest. In the meantime, the following remarks by the Senior Sanitary Officer must be held in mind:—

"It was understood that an outbreak of dysentery amongst the prisoners at the new gaol was attributed to the water supply, but the question of remedial measures was not referred to the Sanitary Department. The fact that there have been within the catchment areas amongst other squatters, charcoal burners, woodcutters, farmers, a new military road and watchman's dwelling have added to the difficulties of the subject."

An estimate of the future position is therefore incomplete, in the absence of information as to protection of water at its source, as to the actual amount of water boiled per day, its method of distribution and

protection from contamination, possibility of access to other sources by prisoners during the course of labour, precautions taken as to segregation and destruction of dysenteric stools, and as to possible amoebic bearers, etc.

In thus regarding various factors which may qualify conclusions, it would seem from a statement made by Dr. JARRETT as to conditions in 1914 that the boiling of water need not *per se* have secured safety (p. 20, Annual Report of the Medical Department, Sierra Leone, 1914):—

“*General Health.*—There was an outbreak of dysentery during the June quarter, which was said to have been brought on by contamination of the water supplied for drinking purposes. Steps were taken soon after the outbreak to have this remedied by having the water boiled, which has been done ever since. The outbreak ceased during the rains, and there were no fresh cases up to the end of the year.”

Fiji.—Dysentery forms an important factor in mortality in Fiji. The following is an extract (p. 3) from the Annual Medical Report for 1914 by Dr. A. MONTAGUE, Acting Chief Medical Officer:—

“Dysentery as usual accounted for more deaths throughout the Colony than any other single disease; 41 per cent. of all deaths at the provincial hospitals, 17·07 per cent. at the Colonial Hospital and 8·87 per cent. at plantation hospitals being due to this disease. Of 564 deaths occurring in the practice of Medical Officers and native medical practitioners, 149 were due to dysentery. A large number of cases and deaths also occur among Indians, not indentured, and Fijians who are not attended by any qualified medical practitioner. The number of cases of dysentery treated during the year was 110 more than 1913. . . .

“The year was a relatively satisfactory one as regards dysentery, although the number of cases attended was higher than in 1913. The mortality rate was lower except among those treated by native medical practitioners. There are several small epidemics in native towns, particularly on the Rewa River and its upper tributaries, but also in Bau, at Gau in Lomaiviti, at Vatulele in Nadroga, and at Ba. Comparatively few cases originated in Suva, or Levuka. The number at plantation hospitals shows a decrease.”

Dysentery and Quinine.

In the Report of the Teck Seng Hospital, embodied in the Straits Settlement Report for 1914 (p. 117), the following remark occurs in a discussion of the influence of the administration of emetine:—“In some thirteen cases, malarial parasites were demonstrated in the blood; whether an individual so infected loses his power of resistance to an invasion by the specific amoeba or bacillus of dysentery is a doubtful point, though one might suppose that the resulting anaemia would render him more susceptible to infection.” This is, of course, a legitimate speculation, and is of the nature which incites to research. It might well be extended by citing the obviously congested condition of the liver, spleen and intestine during attacks, and the influence of repetition of such conditions interfering with the physiological function of the digestive and blood elaborating apparatus. That there is probably increased susceptibility of a malaria stricken population to various forms of intestinal derangements, few would feel inclined to deny. If a population amongst which both malaria and dysentery have prevailed has, by special attention to anti-malarial measures, shown sudden and marked improvement as to prevalence of dysentery, the fact should be of some value in showing some connection between the diseases, if anti-dysenteric methods remained unaltered, or amenability to similar methods of repression.

The following extract from an Official Note by the writer (Information supplied for the Simla Anti-Malarial Conference of 1909) shows that the late Lt.-Colonel FRENCHMAN, C.I.E., then Inspector-General of Prisons, Burma, was so struck with the influence of quinine on dysentery that the first use of quinine prophylaxis in that province was due to that observation :—

“ Valuable evidence on the use of quinine as a prophylactic is forthcoming from information kindly supplied by Lieutenant-Colonel Frenchman, I.M.S., Inspector-General of Prisons, Burma, showing that the method has been in systematic use in the jails of Burma. In 1903, an experiment was made with reference to influence on dysentery in the Myaungmya Jail. Results were so satisfactory that in 1904, the method was extended to six more selected jails. Hitherto, 10 grains per week in a single dose had been employed. By April, 1905, the systematic issue of two 10-grain doses of quinine every week as a prophylactic in cases of dysentery due to malarial taint, was directed in all jails. Feeling more confidence as the results were systematically tabulated and scrutinized, Lieutenant-Colonel Frenchman, in January 1906, further extended its use to all jails in Burma. In the circular on this subject, he required all Superintendents to interrogate and examine every new admission into the jail with the object of ascertaining whether quinine should be administered or not. It was required, in cases where it was necessary to administer quinine, that the treatment should commence at once, and not be postponed till the prisoner was admitted to the hospital. The result was the formation in each jail of a ‘quinine-gang,’ the members of which were kept systematically under two 10-grain doses per week, until the Superintendent was satisfied that all danger of relapse had passed. These principles have been definitely embodied in the Burma Jail Manual, section 982. I attach a summary of results (G and H) on the health of prisoners as supplied by Lieutenant-Colonel Frenchman, showing the admission and death-rates before 1903 and subsequently. My inspection, as an official visitor of jails, has shown me that not only the prophylactic use of quinine is relied upon, but also that each Superintendent carefully observed all mosquito brigade methods. In the majority of cases, the diagnosis of malarial fever is verified by the microscope. It would be idle to say that ordinary sanitary precautions in jails have not also contributed to the total result upon the health of prisoners between 1903 and 1908, but, within this proviso, it is evident the system of prophylaxis has been highly successful. Thus, if the combined admissions and deaths under malaria and simple continued fever in the ante-quinine period be considered, it will be found that the admission rate was 145·40 and the death-rate ·62 per mille of average strength, whilst in the post-quinine period, the admission rate declined to 65·30 and the death-rate to ·53 per mille of average strength. The influence is also very marked on the admission and death-rates for dysentery and diarrhoea, pneumonia, anaemia and debility. Practically, an influence has been exhibited on “all causes;” so that whilst in the ante-quinine period, the admission-rate under this head per mille of average strength was 538·52 and the death-rate 17·28, in the post-quinine period, the rates declined to 297·64 and 14·87, respectively.”

In perusing the original statistics the fall of the dysentery rate seemed to the writer so direct, as to suggest as a legitimate speculation that quinine has an inimical influence upon one or both forms of dysentery. The point would at least seem worthy of research.

Dysentery and Contaminated Clothing.

A preceding note dealing with the vitality of the *Entamoeba histolytica* shows that, in the cyst form, it can exist outside the body for a month. Experiments, so far, have dealt with the amoeba in connection with sand and water. There is nothing before the practical sanitarian to show what, if any, connection there is between dysentery prevalence

and contaminated clothing. As an impression gained from many years sanitary inspection of numerous large jails, in addition to the long recognized agency of flies, partly desiccated blown particles and water, it has suggested itself to the writer that spread of dysentery may be connected with contaminated clothing, more especially blankets. Of course, careful management of a jail implies that no used clothing goes back to store for re-issue to new admissions, unless cleansed and disinfected, but with hard worked subordinates and quickly fluctuating strength of jails, there are at times lax interpretations of both terms. Store-rooms are not always flooded with light nor, in the rainy season, free of damp. Practical experience has dictated to the writer that routine disinfection of all clothing previous to storing, for re-issue, has a decided beneficial effect on jail populations suffering from dysentery. This is a mere empirical deduction, and one which cannot be freed of the protective influence of other preventive measures; but, in the face of the now stated vitality of *E. histolytica* cysts, it is well worth the few experiments that would settle the suspicion.

TYPHOID.

Disinfection of Typhoid Stools.

Dr. HUTSON, Public Health Inspector, Barbados,* calls for special attention to the following method of dealing with typhoid stools. He states its efficacy has been verified "by the bacteriologist of the Massachusetts Board of Health and found to be efficient."

"It was found that the addition of about a cupful of commercial unslaked lime to a typhoid stool will generate enough heat to kill the typhoid organism. Cold water may often suffice, but it cannot be depended on owing to the varying quality of the lime. Hot water from 50° to 60° C. will always give the desired results. The lime used should be broken up in small pieces and distributed over the stool."

CHOLERA.

Cholera in Burma.

The curative branch of medicine has done much to rob cholera of its former death dealing rate, in the presence of Sir Leonard ROGERS' hypertonic saline intravenous treatment. The "*Statesman*" (Calcutta) reports (July 27th) that the recoveries from attacks of cholera in Mandalay under this method have been 67 per cent. The efficiency of this treatment, as now pursued, is an earnest of the benefits of modern research under Sir Leonard Rogers' guidance. The idea was, however grasped many years back, although the methods adopted were crude. Vol. 1, January 1839, of the *Madras Quarterly Medical Journal* contains a paper by Dr. John MURRAY, Dy. Inspector, in which he recommended the use of saline enemata in place of intravenous injection; and he adds that previous to this method being adopted, it was usual to "inject saline solution into the veins, from its having been discovered by chemical tests that the serum of blood in cholera patients is deprived of some of its natural saline ingredients, and the operation was certainly attended with astonishingly restorative effects, but situated as we generally are in this country [India] this plan is impracticable."

*Barbados. Second Annual Report. 1914. p. 17

"PNEUMOCOCCAL INFECTION IN JAILS" (?)

A matter of great interest in connection with the health of the prisoners in Sierra Leone is thus referred to by Dr. BURROWS* :—

"*Cardiac Disease in the Prison* [Freetown] also gave rise to special investigation. It was clearly demonstrated that some obscure affection of the heart supervened among prisoners who had been admitted without any obvious signs of disease. Referring to old records of the Medical Department of this Colony I find that in 1873 heart disease among prisoners assumed proportions necessitating an investigation by the Colonial-Surgeon at the request of the Governor-in-Chief. It was presumably an affection of an infective nature for five deaths supervened among seventeen cases between November 28th and December 12th. Unfortunately, no details seem to have been recorded of the symptoms. Dr. McConaghy has now advanced a theory which is ingenious and which will be more thoroughly investigated when conditions permit the Medical Staff to resume normal duties. Recently a Medical Authority reporting on certain jails in Burma has given it as his opinion that pneumonia is endemic in certain prisons. This Report, received after Dr. McConaghy's was made, serves to strengthen his theory of pneumococcal infection producing endocarditis, etc. (vide Section IV. 'Scientific.')."

The writer suggests that were it not that the Medical Officer in charge of the jail reports that three deaths occurred from myocarditis and one from endocarditis (no post-mortem results however being stated) it would have been desirable, in regard to less evident cases exhibiting cardiac symptoms, to have eliminated suspected past or present beriberi subjects—in the case of a jail where this disease was present to the extent of 32 hospital admissions with four deaths, in 1913.

BERIBERI AND SCURVY.

The following remarks by Dr. DARLING recorded in the *Proceedings of Medical Association of the Isthmian Canal Zone* (April to October, 1914, p. 92) are of interest, in regard to the group of food deficiency diseases :—

"Funk mentions five groups of symptoms observed in diseases caused by food theoretically deficient in 'vitamines' :—

"1. Nerve degeneration with paralysis and contractures.

"2. Cardiac: Dilatation of right heart, dyspnoea, cyanosis, oliguria.

"3. Anasarca, hydropericardium, hydrothorax, ascites.

"4. Scorbutus with mouth lesions, skin, subperiosteal haemorrhages, and bone lesions.

"5. Pellagra syndrome: Stomatitis, gastrointestinal lesions, skin erythema, and multiple-nerve symptoms."

"While Funk may be right about the etiology of groups 1, 2, 3 and 4, it would seem to be unwise to include pellagra in this group, for among other reasons, while pellagra is a disease 'occurring in maize-eating countries par excellence,' the eating of overcooked, undercooked, and overmilled, kiln-dried maize in large quantities takes place among negro labourers and natives in South Africa to an enormous extent, for it is frequently their sole article of diet. Yet pellagra is practically unknown among that class—they do, however, suffer from scurvy."

Alluding then to the cardiac hypertrophy and dilatation, long recognized as found in beriberi and the Rand type of scurvy, he proceeds to show the alliance of the two diseases by comparison of the clinical symptoms, as judged by cases seen by him in the Rand :—"In addition

* Medical Report on the Health and Sanitary Condition of the Colony and Protectorate of Sierra Leone for the year 1915.

to these, this lesion is constantly found in beriberi and the Rand type of scurvy. It is the type known as eccentric hypertrophy or hypertrophy and dilatation characterized by thickening of the muscle and an increase in the size of the cavity. It seems to be due to a gradual strain on the right ventricle from loss of vagus innervation." This clinical picture is followed by an allusion to a statement by Couvy (*Annales d'Hygiène et de Médecine Coloniales*, 1911, No. 1, p. 97) who

"gives an interesting account of an outbreak of beriberi and of scurvy in a garrison of soldiers at Akjoucht (Mauritania, May to September, 1908). There were 150 natives and 11 Europeans. Beriberi appeared first among the natives, later cases of scurvy appeared among them. The officers, however, during the same period, had only scurvy with no symptoms of beriberi. . . .

"Among those suffering from beriberi, as well as scurvy, the suppression of rice from their diet and its replacement by other articles, was followed by the disappearance of cardiac troubles, asphyxia, pulmonary edema, and subcutaneous edema, but had no effect on the classical lesions of scurvy: Spongy gums, muscular pain, and induration of limbs.

"This very instructing observation of Couvy illustrates the personal racial or idiosyncratic factor of this group of diseases, for as far as can be ascertained, following the use of meat with one other article of food (polished rice), and associated with excessive consumption of salt (saline spring water), two distinct syndromes appeared among the men who were getting the same ration (native soldiers)."

During the discussion which followed Dr. Darling's paper, Major ASHBURN brought forward evidence to show that "classical scurvy is clinically, pathologically and etiologically different from beriberi," and added that there may be "other deprivation diseases, due to the lack of unknown vitamins that produce diseases resembling both, and that the two diseases may coexist in the same individual in varying degrees of severity, and so account for a whole gamut of clinical symptoms that seem to connect the two and make them appear like clinical variations of a common disease."

Finally, Dr. Darling, at the end of the discussion, took care to emphasize his position as follows:—"What I had hoped to bring out was that the two points of contact in these widely different diseases, namely, right-sided cardiac hypertrophy with degeneration, and degeneration of the vagus pointed to a somewhat similar acting cause—dietary deficiency."

The material brought to bear on the subject by Dr. Darling from his observations in the Rand is of much value, in supporting his main contention of the analogy between scurvy and one of the recognised forms of beriberi as food deficiency diseases. But the evidence appears to the writer to leave the subject at that point. There would seem as much evidence to term the food deficiency disease found in the Rand beriberi as scurvy.

The quotation of Couvy Dr. Darling affords would support the opinion that the two diseases, in the presence of diet deficiency, can prevail together or at different periods of neglect of specific food substances; thus, Couvy considered that "beriberi appeared first among the natives; later, cases of scurvy appeared among them." This would certainly tend to show that these two diseases can appear concurrently, and the chances are that the interval between the scurvy and beriberi emphasizes the deficiency, in proportion to the grade of physiological requirements, of two distinct vitamins.

To such an argument, Dr. Darling replies as follows:—

"It may be urged by some that there is latent beriberi on the Rand and that many of the cases of scurvy overshadow the beriberic symptoms. This can definitely be ruled out, for in all the cases I examined with regard to this point the knee reflexes were exaggerated, *not absent*, as in beriberi, there was no anasarca, and no paralysis or extreme general atrophy as in beriberi. Besides, the pathological material examined was taken from cases which anatomically were uncomplicated scurvy."

This presumes that it is pathognomonic of beriberi that the reflexes should be absent. This however the writer would regard as an assumption founded upon observations of beriberi cases in a late stage. In the early stage, there may be exaggeration of the knee reflex.* If then this differentiation of the two diseases be not exact, there would be left in doubt, as to applicability, Dr. Darling's pathological observation, founded on post-mortems in the *Rand scurvy cases*, that there existed "right sided cardiac hypertrophy and dilatation and fatty degeneration of the vagus and its branches." The bulk of the evidence would go to show, as in COUVY'S cases, that in the Rand not solely scurvy but beriberi with scurvy superadded was dealt with.

HELMINTH INFECTION.

Healthy Hosts of Parasites in Sierra Leone.

In Section IV of the Annual Report of the Medical Department of Sierra Leone, 1915, Dr. G. G. BUTLER from a careful study of 75 *apparently healthy boys* of the Bo School gathered much useful information.

Examination for malaria showed that 37·3 per cent. were infected, all except two being bearers of the sub-tertian parasite. He found that those of low average age had a higher rate of infection than those of a greater age. 50 per cent. of the boys showed "some enlargement of spleen."

Ankylostomiasis. In only one of the 75 boys absence of ankylostome ova was proved, and Dr. Butler considers that, seeing in 80 per cent. of the infected subjects ova were found in a single examination, infection must be held to be heavy. To this he adds the observation that these boys in no way exhibited any of the classical symptoms of ankylostomiasis and, supported by the fact that their school sports were fully as vigorous as those of a public school in England, there would seem no ground to suspect present inimical effects; although he suggests that, in the presence of debilitating influences, which might supervene in future, such results might well occur.

Filariasis. 9·3 per cent. of the boys were found to harbour microfilaria (all sheathed) apparently of the *nocturna* type.

Bilharziasis. Infection with malaria, filaria and ankylostomiasis, and yet for the subjects to be apparently in health is a fairly good record, but Dr. Butler had not thus exhausted possibilities. He found no less than 26·6 per cent. suffered from bilharziasis, yet, "the Annual Medical Report during the last ten years only mention five cases."

*This opinion is also expressed by Colonel W. H. WILLCOX, C.M.G., p. 191 of the *Jl. Roy. Army Med. Corps*, 1916. Aug. The writer in a Report to the Madras Government dated Oct. 1899, drew attention to this fact.

His attention to this subject was first arrested by examining a case of supposed gonorrhoea. He had previously found such cases to be really instances of urinary infection with Bilharzia, and that natives cannot differentiate between the two diseases, both of which are known in Mendi as "Kanye." They, however, distinguish a white variety and a red, the latter pointing to bilharzia. In instances of infection, no cystitis was found, and Dr. Butler concludes that "it would appear therefore that urinary Bilharzia disease may eventually be present without causing any signs of cystitis whatever, and without giving any trouble to the host though in young children most severe signs of cystitis are usually present."

The importance of these observations in endeavours to prevent spread of the disease is obvious.

In regard to etiology, Dr. Butler states that the 19 boys found free of the disease came from a district where the streams dry up in the hot season (Timnee), whereas those infected came from a district (Konnoh) where streams are permanent.

WATER.

Disinfection.

The presence of electric power is not confined, in the present day, to temperate zones, nor the necessity for disinfection. Hence, the following simple arrangements used by Mr. DAKIN on the "Aquitania," as described in the *Times* of the 1st January, 1916, should be found useful in certain emergencies:—

"The apparatus consists of an electrolytic cell, a reversing switch capable of carrying 100 amperes, and some ordinary insulated electric cable. The cost is about £50. The cell stands upon a rubber mat to insulate it, and is raised upon a low table to enable its contents to be poured out easily. It is filled with cold sea water, and if a current of 60–75 amperes at a 110 volts be then turned on a solution containing two parts of sodium hypochlorite or available chlorine to 1,000 parts will be obtained in five minutes. The cost of this solution works out at 3d. per 100 gallons.

"This solution can be used, diluted with equal parts of sea water, for swabbing floors, latrines, infected areas, and decks, and acts as a powerful disinfectant and deodorizer. . . .

"The solution is also excellent as a sterilizer of drinking water (one part chlorine to one million parts), and as an antiseptic for wounds (used undiluted as produced by the electrolyser, i.e., two parts hypochlorite of soda to 1,000 parts). . . . It was added to the water in the swimming bath of the ship in the proportion of one part in two million parts, with the result that bacteria which had formerly been present in the water to the number of 2,000 per cc. were reduced to 200 per cc. or 90 per cent. . . .

"In the case of the Aquitania the economy in largely replacing expensive coal-tar disinfectants, such as carbolic acid, cresol, etc. by electrolytic hypochlorite will approximately pay for the cost of the cell (£50) in the course of a single trip of three weeks."

The electrolysis of sea-water for the production of sodium hypochlorite is of course not new, but Mr. Dakin's simple method of adaptation of the principle involved is of value.

The Efficiency of Public Water Filters.

The following extract from the Report on the working of the Microbiological Section of the King Institute of Preventive Medicine, (C302)

Guindy, Madras, for 1915, shows that the Director, Lt.-Col. GIBSON, I.M.S., is energetically pressing forward work on the subject of water storage and purification, which must prove of vast utility in aiding practical sanitary advance in the tropics :—

“A very large number of samples were examined in connection with the experimental filters at Guindy, the Madras Corporation at Kilpauk, and proposed or extended water works in the mufassal. . . .

“An examination of a very large number of results of bacteriological examinations conducted during this and previous years leads to the conclusion that, in some way or other, sand filtration exercises a selective action on water bacteria, and that in general the lactose fermenters are much more completely eliminated than other kinds. In other words, and as compared to English results, the total counts are relatively high notwithstanding the fact of the lactose fermenters being satisfactorily decreased. As the lactose fermenters are the main indication of potentially dangerous pollution, this state of affairs is a highly satisfactory one. An explanation of this is probably to be found in the interesting discovery made by Assistant-Surgeon T. Sitapati Ayyar that a very large percentage, 98 per cent. in fact, of the total count in sand filtered water are spore-bearing or coccal forms. It may probably be inferred from this that spore-bearing forms succeed in penetrating the filtering skin while in the comparatively small spore state, and that efficient sand filtration does as a matter of fact completely eliminate all bacillary forms. Should this find be confirmed by further investigation with Madras and other Indian waters it will be one of first class importance, since the organisms of all waterborne-disease are bacilli.”

FOOD.

The Corrosion of Metals.

The question of corrosion of metals is one to which the engineer gives special attention in regard to strength of material, but in regard to food preparation and preservation, sewerage and water supply, the subject is also of interest to the sanitarian. The following extracts may therefore be of utility :—

“The results of the investigation into the corrosion of metals indicate very clearly that cast brass, sheet brass, copper, and lead are corroded by dilute solutions of bleaching powder, acetic, nitric, and hydrochloric acids. These acids and bleaching powder are used extensively in the hospital and eventually find their way into the waste pipes of plumbing fixtures. The corrosion was more marked when the metals were only partially submerged, and also when they were submerged intermittently with intervening opportunities for drying. Under these conditions, the metal showing the most pronounced degree of corrosion was lead.”*

Aluminium.—In 1896, the Imperial German Health Bureau stated :—

“Aluminium is entirely free from communicating to food any poisonous salt such as is given off by copper, tin, or lead. To make sure that no injurious effects need be feared if aluminium be taken into the system, two physicians, aged respectively twenty-six and thirty-five, volunteered to act as subjects. To each of these was administered daily, with their lunch, about fifteen grains of aluminium tartrate for a period of a month. By the end of that time neither had lost flesh or appetite, nor felt the slightest discomfort. For cooking purposes this metal seems to be peculiarly adapted, as it is a splendid conductor of heat, while it has also the advantage of being non-poisonous and non-corroding.”

* Report of the Department of Health of the Panama Canal for the Month of April, 1916.

This positive opinion does not accord with that expressed by the U.S. Public Health Service Annual Report (Division of Pharmacology) which stated (p. 92, 1915) that :—

“ Additional analyses of the ordinary foods for their content in soluble aluminium salts were made. It was found that almost all vegetable foods contain small quantities of aluminium. The continued administration of aluminium salts to animals leads to nephritis with the appearance of albumin in the urine. The question as to whether the quantities of aluminium salts consumed by man have any deleterious effect upon the body is still left open.”

The following is quoted from the Transactions of the International Engineering Congress, 1915 (p. 569) :—

“ Moist air rusts aluminium, not as quickly as it does iron or steel, but about as quickly as it does copper. An apparent exception to this statement is the white aluminium paint, which is weather-proof, but this is because the aluminium in it is ground up in presence of grease, which coats each particle and protects it from oxidation.

“ The oxidation of polished aluminium takes the form of a thin white coating, quite continuous and adherent. It changes the color of the metal to a grey, and sometimes shows up spots like cigar ashes where the metal is not uniform in composition. Greasing or lacquering of the polished surface protects it well from oxidation, just as it would polished iron or copper. It can be re-polished by using bathbrick or sapolio, finishing off with silver polish (tripoli or electron) if a high polish is desired.

“ Paint does not adhere well to polished aluminium, and if it is desired to protect with paint the surface should first be roughened or frosted, either by an acid wash or by sand-blasting. Oil paints adhere best. Aluminium surface can also be chemically blackened by a copper sulphide coating (gum metal or black-iron effect) giving a surface quite resistant to the weather, or to the effects of ordinary handling. This is frequently applied to sextants and surveyors' instruments.

“ Only hydrochloric acid and caustic alkali solutions act strongly in the presence of salt. Soda solutions attack it and blacken it, they should be kept away from aluminium vessels. The highly seasoned curries of India are said to be hard on aluminium cooking utensils. The most severe combination it is likely to meet in ordinary cooking is strong vinegar and salt. Strongly acid tomato stew had some action on it, mostly in the direction of cleaning, for the utensil is brightened up inside by cooking tomatoes in it. On the whole, however, all common foods can be said to be without perceptible chemical action on aluminium, so that such cooking utensils are practically indestructible.”

The writer suggests that it is probably not the “ seasoning ” of curries (if that term be confined to the various vegetable matters employed to render them hot to the palate) but the vegetable acid juices which are employed with them, which act on the aluminium. The verdict of “ practically indestructible ” depends very much upon the type of cook procurable for camping life !

Metal pipes.—According to “ The Englishman ” (Calcutta) of 15th June, 1916, clay soil affords protection to the exterior of pipes, provided it does not contain corrosive elements, “ and if puddled close around the pipe only a few inches will seal the pipe from outside influences, corrosive or otherwise for an indefinite period. As a general rule clays do not contain ingredients conducive to corrosion.” But owing to oxygen contained in porous sand and alluvial soil, there is, in the presence of damp, a corrosive influence ; especially “ if they contain acids due to decaying vegetable matter.” To neutralize this influence, the alkaline influence of lime may be employed “ by surrounding the

pipe with lime or cement," or, before filling in the trench, pouring on the top of the pipes a thick solution of milk of lime. As to protecting the interior of pipes from corrosion the same paper* states that "experience has proved that a mixture of gas tar and oil in correct proportion" serves the purpose as well as in the case of mixtures containing, in addition, "a proportion of natural asphalt or constituents of it such as bitumen."

For protecting the gas tar and oil layer in the tropics when exposure to sun before laying is necessary, it is advised to protect it by a layer of lime washing.

*The Englishman, 22.6.16.

TREATMENT OF WASTE.

FILTER LATRINES.

In a previous number of this *Bulletin* [Sanitation Number, Vol. 4, No. 8, pp. 458 to 462] makeshift methods of using small aerobic filters as aids to sullage and sewage disposal are described, as introduced by the writer (W. G. KING) in 1895 in the Madras Presidency. These were based on results secured up to that period by the Massachusetts State Board of Health. At the end of 1906, these ideas of adaptation were further expanded by his designing the filter trench and filter pit latrines described in the above reference. These contemplated the automatic separation of the urine and solid excreta, and the disposal of the urine, and ablution water if any, by soakage into the soil after filtration. It must be held in mind that this soakage into the soil after filtration is a very different matter to the use of so-called "soakaway pits," which have been long employed in military camps. Presenting as the filling of such pits does many voids in the midst of possibly impervious material, it is likely a certain amount of purification of fluids containing organic matter does occur in these before disappearance of fluids in the soil, but the Massachusetts State Board of Health trusted to no fortuitous conditions; they worked out the efficiency of aerobic filters based on definite thickness of layers of sand and its character, and size of gravel employed. For example, at pp. 431-452 of their Report for 1897 will be found their results of filtration of urine on such filters.

A grant was made at the end of 1906 by the Burma Government for experiments with these latrines. These were conducted by Lt.-Col. B. SINGH, who erected them so that they should be used by the known population of Jail Warders at the Central Jail, Insein. The result was successful. The writer's successor, as Sanitary Commissioner for Burma, Lt.-Col. C. E. WILLIAMS, has encouraged the use of these latrines, and as a result of his experience speaks well of their sanitary utility. He has further adapted the idea by excogitating a form he considers suitable for use in flooded towns, such as are common in the Delta of Burma. He also finds it possible to use a layer of dry earth over the latrine filters with satisfactory results as to odours. Seeing that there are localities where sand is by no means easily procured, the fact that Lt.-Col. Williams' experience of their working, in the presence of a superimposed layer of earth, shows that efficiency is still preserved, should tend to increase the sphere of utility of these filter trenches and filter pit latrines. He gives his experience on the subject in the Annual Sanitary Administration Report for Burma, 1915 (p. 17):—

"The aerobic filter system of latrines is slowly making progress in official estimation, and is being adopted in a number of fresh centres and out stations. There still exists a prejudice against the system on the part of some officials and communities who have had no experience of its working. The Town Committee of Pyawbwè contemplate introducing the bucket system, although the funds of this town, only recently constituted a 'notified area,' must be very limited, and the aerobic-filter system offers great advantages as compared with the 'removable receptacle system' in the economy of both initial and current expenditure. But the economical character of the former system is not its main recommendation in my estimation. Were it even more costly than its rival, I would still urge its adoption on the ground of its greatly superior sanitary efficiency."

EXCREMENTAL POLLUTION OF SOIL.

Local authorities, informed that in such and such an area of a town human faecal deposits are frequent, are liable to regard the assertion of the sanitarian as an exaggeration of facts. The walks of members of Municipal Bodies are not likely to be taken by choice in insanitary areas and, if duty does so dictate, it does not follow they feel particularly inquisitive as to unpleasant facts. Under these circumstances, a mode of securing concurrence as to necessity for action is to ascertain measurement of means of transport, distances to be traversed, and number of trips possible and how far this resultant is capable of dealing with the estimated excreta of the population dealt with per day. For this purpose, the sanitarian not "above his last" should not be content with a list of means of transport said to be available; a full parade of the collection and transport staff, together with mechanical means employed, is essential. The revelation as to defective plant and plant under repair, and animals absent on account of illness, and of want of organization to meet the ends in view (even if the means are complete) may be noteworthy, and sufficiently explain facts as to soil pollution, in spite of supposed existence of efficient means. If the amount of excreta left unremoved from the area is large, an impression of its bulk may be borne in upon those responsible by computing the size of a column of faecal matter in cubic feet.

In connection with the Rockefeller Ankylostomiasis Campaign, a sanitary survey (U.S. Public Health Service Annual Report, 1915, p. 17) as to chances of faecal pollution of soil has been carried out on the following system, which should form a useful alternative to the above more direct method of calculation:—

"In the sanitary survey to determine the degree of soil pollution in rural districts the State Boards have now accumulated the following statistics:—Of a total of 250,680 farm homes, scattered over 653 counties in eleven States, 125,584 homes (50 per cent.) had no privy of any description, so that a theoretical maximum of soil pollution was occurring around these homes.

"The details for all the homes are as follows:—

	Points.
1,360 homes with type A privies, at 100 per cent. . .	136,000
842 " " " B " " 75 " " . .	63,150
965 " " " C " " 50 " " . .	48,250
8,247 " " " D " " 25 " " . .	206,175
113,682 " " " E " " 10 " " . .	1,136,830
125,580 " without any privy " 0 " " . .	0
250,680 " give total score of	1,590,395

"Average privy index, 6·3 per cent.

"These figures (6·3 per cent.) show a slight improvement over the average (5·8 per cent.) for the 189,586 homes for which statistics had been accumulated up to the preceding report."

SANITARY WORKS.

MALARIA AND DRAINAGE.

When Ross advised the oiling of pools as a means of getting rid of mosquitoes, there was exhibited in his Report to the Government of India no desire to supplant drainage which should get rid of the pools. It was urged solely as an adjunct, which was of special utility where the cost of drainage could not be met. This merit has been proved indisputedly in practice and, in the proving of it, there has been no absence of disputation.

Of the efficacy of drainage as an anti-malarial measure, there existed no doubt long before the mosquito had been inculcated. It sufficed to believe that to secure the production of malaria, there need but exist moisture in a soil in excess of requirements of vegetation, the presence of organic matter (by preference from decomposed vegetable material) and a certain grade of warmth. In later days, to this creed was added the belief that there was present in particular localities a malarial "germ" in the soil, which flourished, or was latent, in accordance with the grade of the favouring conditions. To lower the subsoil water of a water-logged soil, to bring the land under a high grade of agricultural cultivation, to get rid of pools by drainage and, as a last resort, to cover land with a constant sheet of water as a palliative, were recognized anti-malarial methods. The use of quinine as a prophylactic was also well recognized.

If the theories excogitated to fit the results of these anti-malaria measures were wrong, the facts on which the false theories were founded were indubitable. Nevertheless, in one important part of the tropics it has been thought necessary to make experiments on drainage in connection with malaria, not, for example, with the avowed object of ascertaining whether excessive soil moisture control could be secured by particular methods in a locality presenting special engineering difficulties, but with the idea that drainage as an anti-malarial measure was open to question in the new light of the mosquito theory. But, putting aside opinions of this extreme character, there will constantly be found amongst authorities in charge of funds in the tropics, the honest opinion that *drainage* can only be secured at a cost which is "prohibitive," and hence a *laissez faire* attitude is adopted. Indeed, the term is so satisfying to many consciences that to enter into the question of framing even approximate estimates seems supererogatory. An opinion so formed in any locality is liable to be transmitted without question from one temporary official to his fleeting successor, by means of "office files," for years on end.

The duty of the sanitarian, in the presence of such a dictum, is certainly to uphold the truisms that the oiling of pools affords valuable control of mosquito larvae, that screening favours protection of humans from the possible attention of adult females, and that quinine prophylaxis decreases possibilities of their transferring malarial parasites; yet, at the same time, to insist that the control of moisture (surplus to requirements of plant life) by relief of surface and subsoil water, by measures commonly embraced in the term "*drainage*," is *the radical remedy*.

It may, however, safely be assumed that those who doubt the efficiency of drainage as an anti-malarial measure when stripped of financial impediments, real or fancied, are rare. Hence, it behoves the sanitarian to ascertain under which of the two categories the doubts of the public authority concerned are to be classed, and to attempt conversion.

In undertaking this task, unless the sanitarian is prepared to suggest a scheme which does not ignore the fact that both palliative and radical measures may of necessity, at certain stages of progress, accompany each other, and to back his opinions by *at least an approximate estimate of cost*, the chances of securing conversion are small. If available (as a weaker alternative argument), an instance of anti-malarial measures under analogous conditions of soil, cost of labour and material might be of some utility, but there should be no doubt as to the analogy. For example, an unqualified reference to success on the Panama Canal works in using not one but all appropriate anti-malarial measures, is likely to bring the sanitarian abruptly in contact with one of the main props in argument of the *laissez faire* policy, namely, the popular (and erroneous) conception of the cost of anti-malarial measures in that connection. The data secured by that splendid example of sanitary work have been misapplied, owing to absence of sufficient knowledge of local financial methods, to opposition of similar efforts elsewhere.

But an argument driven thus far successfully by the sanitarian is still liable to fail in its purpose. The authority to hold the purse strings and a knowledge of what is meant by "drainage," of the character required in anti-malarial measures, may not go together. There is, of course, no trouble in the average member of a Local Board remembering there are such things as surface drains; but the conception is usually limited to functions fulfilled by these in towns, and this applied to requirements of drainage in rural areas (apart from houses and streets or suburbs) brings to the mind a series of crude notions as to their applicability. Consequently, whilst the concession may be made that the adoption of drainage as an anti-malarial measure possibly may be financed in prosperous towns, it may be contended this is out of the question in the poorer rural areas.

When the sanitarian finds this view placed before him by an unrepentant public authority, the writer advises that the term "drainage" be dropped and, in lieu, thereafter be used the phrase "relief of surface and subsoil waters."

The term at least secures a clear conception of what the ends sought are, whilst leaving the means, which are not confined to "drainage," popularly so-called, a matter of selection as to cost, adaptability and efficiency.

URBAN OR RURAL AREAS FIRST.

Those who would differentiate anti-malarial treatment according to the classification alluded to in the preceding note, ordinarily confine their opinions to the employment of surface drains, and the relative incomes of public bodies per head in rural and urban areas, respectively. They maintain that such money as may be available could better be devoted to the large populations of towns than to the more scattered populations of rural areas.

As to the relative cost argument, the chances are always that selected highly malarious villages containing an aggregate of, say, 20,000 inhabitants, could be made rid of malaria at less cost than feasible for a single highly malarious town of the same number of inhabitants. Without going into details on this point, it would suffice to show that, other things being equal, the relative cost of vested interests, land, labour and material, and, above all, the large area actually occupied by houses in urban areas, by limiting choice of engineering methods, is liable to turn the balance decidedly against the town areas. But, the truth is that to make any hard or fast line between urban and rural areas is absurd. Such distinction ignores the patent fact that the human being is the carrier of malaria, and that no locality producing such carriers is otherwise than a danger not only to his immediate neighbour *but to the country at large*. This being so points to the necessity of anti-malarial measures being regarded by local bodies in charge of large rural areas as meriting financial aid from central funds, where in the presence of decreased prosperity of the community owing to severe malaria incidence, local resources do not suffice; and, secondly, to the conclusion that anti-malarial measures should not be conducted on the principle that rural areas must wait till urban areas be remedied, but that the great malaria centres of a province should be deliberately selected in respect to their danger of producing carriers possessed of travelling facilities on important lines of traffic, and that *radical* anti-malarial measures should be applied accordingly, whether they be rural or urban. Equally, there can be no real differentiation of anti-malarial measures applicable.

As to cost being "prohibitive," the relation therefore is not between urban and rural areas but between mosquito-breeding areas, and the possibility of their being rendered unsuitable for breeding. All practical workers readily realize that, in the neighbourhood of malaria stricken villages, the little dribble of clear subsoil water making its exit in surface pools, which for generations at certain seasons have furnished motherly mosquitoes their opportunity, and have been the headquarters for raids upon unsuspecting humans—whether in urban or rural areas—may often be dealt with at a cost which might be less than the capital *wasted* by the sickness of half a dozen inhabitants. Indeed, opportunities of dealing with trivial and localized causes of malaria propagation are so great in rural areas that to neglect them by reason of an ill-conceived differential classification of the nature discussed, is inimical to reasonable sanitary advance.

PRELIMINARY SURVEYS FOR RELIEF OF SUBSOIL AND SURFACE WATERS.

Lay authorities, hesitating as to expenditure on radical measures for relief of subsoil and surface waters, are usually confronted with a difficulty that may not be apparent to the sanitarian. They are asked to consider the circumstances of a locality already malarious, and to believe that surplus water conditions are at the root of the evil. They may well recall immense areas under irrigation, or other causes of excessive receipt of surface flow, which nevertheless are free of malaria. Hence, the sanitarian must be prepared to discuss the sanitary history and physiography of both the malaria stricken and malaria-free locality, in relation to facilities favouring propagation of special

anophelines. But, before it is possible for him to make proposals for a particular locality, it is necessary for him to have fulfilled a complete sanitary and anopheline survey of the area concerned. Now the "area concerned" is a point worth defining. According to one school of malariologists, before it is possible to treat the surroundings of an inhabited area, not only its immediate neighbourhood but a whole province of many thousand square miles may have to be examined. Yet the mosquito is autochthonous in its method of conveying disease; and if after a lapse of 18 years since Ross's discovery it is found that, according to the evidence quoted in the preceding note, *a mile zone implies reasonable safety and less distance a fair approach to it*, the question of the "area concerned" and the anti-malarial measures necessary within it should be capable of statement and of estimate.

It is obviously of no use to measure the zone as "within municipal lands," which may have a zig-zag boundary giving various measurements. If the zone selected be a mile, the radius of the circle must be from the outermost houses of the inhabited area to a point a mile distant, whether that be within or without the area of any particular public body. But if such arrangement cannot be effected, it is apparent from the evidence quoted in the proceeding note that, as the distance within the mile decreases the protection becomes less, till the minimum of 200 yards is reached; and that, consequently, it must be rarely that a useful, even if incomplete, grade of protection cannot be secured *in proportion to money expended*.

To decide the most advantageous area capable of treatment for funds at disposal, it certainly does not suffice for the sanitarian to forget that he is not an entomologist, and think his task accomplished by a classification of mosquitoes. He has to satisfy himself which water sites they owe their breeding capabilities to, and how best with economy these can be got rid of. For the purpose of the necessary survey, the following extract by the Sanitary Commissioner for the Government of Madras, in February 1905 (W. G. KING) bringing several of the requirements to notice, may be quoted:—

"Having settled the various sites where anopheles larvae are to be found, the next question that presents itself is as to how far it is feasible to eradicate such pools, and, if not, how far it would be advisable to adopt palliative measures by the use of larvicides. To this end, it is necessary to study the whole configuration of the country for several miles round, firstly, with the object of ascertaining how far the configuration affects the surface or subsoil water supply and, secondly, in determining from what furthest point the flight of the adult mosquito might be anticipated . . .

"As to the configuration of the country affecting surface and subsoil water, necessarily, there can be no limit of the area which must be taken into consideration. A complete general knowledge of the trend of the country, of neighbouring hill ranges and of streams, must be secured by actual observation, and by means of maps. Nor when this much has been done should the observer rest satisfied. In a country where irrigation by artificial impounding of streams and surface waters is constantly effected, attention must be given to the influence of artificial canals having their levels above or below the surface soil, not to speak of the attendant huge areas of country laid under cultivation with the aid of irrigation. It would be impossible, in the limits of a Circular of this description, to enter into the many points which should constitute a sanitary survey of the nature requisite, but it may be said briefly that officers should hold in mind and systematically investigate the following points.

“What is the height of the subsoil water of the area? Is there great variation in one part as compared with another? If so, what is the cause of variation and what the nature of the obstruction? Is it due to the formation of any tank bund reaching to the first impermeable stratum of the subsoil in the direction of the outflow, or to constant soil saturation under irrigation at the natural point of exit of the subsoil water; to the introduction of a canal athwart the natural exit, or to the recent raising of the water level of a river or canal by means of bunds or permanent addition of volume of water; or, instead of being at the natural point of outflow of subsoil water, have such factors been introduced on the upper part of the trend of the country, and therefore of the probable subsoil water gradient. It will be noticed that any of these factors may imply the existence of pools and sluggish streams of water more or less permanent following obstruction to surface, and subsoil drainage, or raising of the subsoil water level; and that certain of these conditions might lead, in a country with a fair slope, to a condition of springs appearing at the surface, in such a manner as to produce that periodical renewal of clean water which is the delight of the anopheles. . . .

[Here followed local illustrations of conditions mentioned in relation to malaria production.]

“The above illustrations obviously afford room for the application of various methods such as, in the instance of a canal aligned above the general level of the country, cutting a catch water drain or subsoil water drain between it and an inhabited area, or of breaking the bunds of a tank including its puddle foundation, so as to permit the free exit of surface and subsoil water at the terminal end of a drainage line; the diverting of springs, so as to take a definite course, instead of permitting them to disperse themselves over large areas in the form of pools: the making of surface drains so as to connect pools and drain them to a favourable point for discharge: the cutting through banks of rivers that obstruct sub-streams from pursuing their original course: cutting into banks of rivers whose configuration has been changed parallel with their course, so as to secure a subsoil drainage system with the exits at a lower point of a river: the altering the outlet of channels and small streams and changing the shape of the bed and banks, so as to secure a velocity as nearly approaching three* feet per second as feasible, without allowing of nooks protected by vegetation so as to permit of calm spots, or effectually lining their banks for this purpose with smooth masonry: the introducing of water required for garden crops by means of covered pipes, instead of using open channels and cisterns, and seeing that the quantity is so regulated as to be absorbed fully and daily by the earth to which it is to be supplied: the filling in of excavations or natural hollows in which water is liable to accumulate, or the periodical baling of them out individually, or leading them all to a suitable point for discharge; or where such point cannot be secured, employment of lifting by simple machinery, such as piccottah, wind or water-power, oil engine, etc. . . .

“In carrying out minor sanitary engineering schemes to meet the above ends, it may often result that estimates will show that the work required cannot be effected with the funds at disposal, if highly finished materials be employed. For example, if estimates for subsoil drains depend upon prices in Madras, *plus* transport up-country, it becomes hopeless to expect progress. But ordinary village potters† can easily turn these out at a very small price, if they be shown once what is required of them. Very often instead of the use of subsoil drains, by means of cheap labour easily procurable, rubble from neighbouring fields may be obtained, which thrown pell-mell into trenches make very good so-called ‘Irish drains,’ which perform their purpose perfectly well. Again, in rendering a drain sufficiently smooth to prevent lodgment of water, it is by no means necessary to go to the expense of cement plastered concrete or masonry. Rough (lime mortar)

*My own observation would seem to show that even one foot per second suffices, but this requires confirmation.

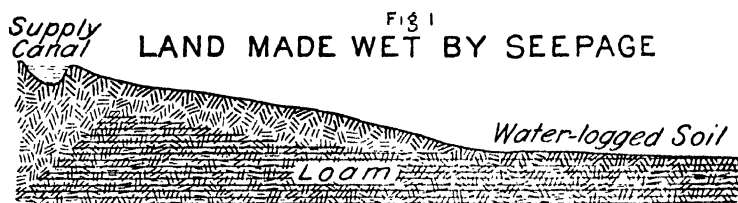
†The “village potter,” provided with a hand-worked pipe-making machine, and some supervision on first using this aid, is at once a cheap and expeditious agent.

revetment with boulders although possibly diminishing velocity would at least secure the absence at the side of a stream of nooks, where the mosquito may deposit eggs with comfort to herself and safety to the future larvae. In studying economy in connection with channels of water where the use of a smooth lining and increase of velocity are requisite, it may often be found possible to considerably shorten the length of the stream by altering its course in accordance with the levels. In using kerosene oil, it should be remembered that the cheapest variety obtainable in the country may be safely employed. In filling up hollows near villages instead of carting earth from a distance, ruined houses and ruined walls will be found to afford plenty of material. Clearing such structures out of a village would be of benefit in respect to perflation. . . .

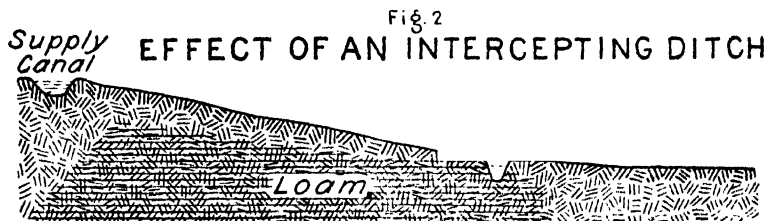
"In proceeding to conduct improvements after the 'endemic index' of the infected area has been definitely ascertained, it is desirable that the officer should traverse the whole tract of the country with his Overseer, and personally point out to him what is required. The Overseer should then prepare a survey plan of the area exhibiting its contours and levels. Upon this should ultimately be exhibited the various pools in which anopheles have been actually found. It will then be possible for the officer to consult with the Overseer as to the best points for discharge of surface water, or removing sources of obstruction, etc. After the plan and estimate have been fully prepared, the District Sanitary Officer should again visit the area, and come to a final determination as to the relative financial and sanitary value of various methods proposed for effecting the desired object. For such work, the new class of Sanitary Inspectors [Madras Presidency 1894] who have undergone Minor Sanitary Engineering training ought to be of great value."

INTERCEPTION OF SURFACE AND SUBSOIL WATER FLOW.

As to methods to be employed for the above purpose much useful information has been brought together in a paper entitled, "Drainage as a Corrective of Irrigation," by C. G. ELLIOTT (International



Engineering Congress, 1915, San Francisco). In this he urges the importance of the engineer undertaking a preliminary survey by borings to ascertain "the elevation of the surface and the water level and the position and character of the modifying factors beneath the surface,"

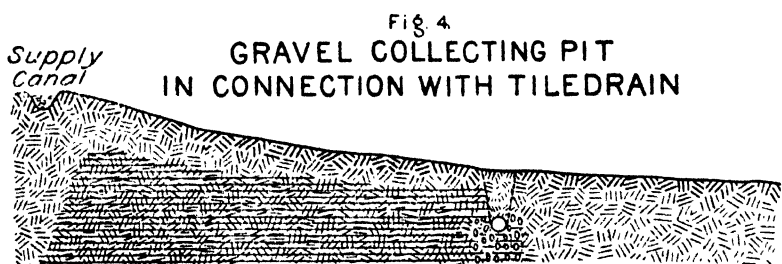


so as to secure data regarding "the source, behaviour, and movement of the ground water which water-logs the tract of land. The drains

should then be located in accordance with the theory evoked. One principle simple in itself but not always easy to apply is to place the drain where the water enters and begins to accumulate on the saturated tract." In the light of the latter remark, the illustrations afforded by him showing methods of using intercepting drains (Figs. 1 and 2), which are here reproduced require no further explanation. Figs. 3 and 4 illustrate methods used where water under pressure cannot be



intercepted "sufficiently deep to reach the underflow and cut off the pressure of supply. Under such conditions, the drains should be supplemented by relief wells which should be sunk well into this water-bearing material." Fig. 4 presupposes the existence of a suitable



distant discharge point, and would apparently collect both the seepage water from the canal as well as the water from a stratum immediately below that under pressure.

In Fig. 5, he shows an amplification of the method depicted by Fig. 1, which should prove of frequent utility in anti-malaria work. The use of relief wells is by no means a new idea* but, so far as the writer knows, it has not been customary in British practice to employ them otherwise than at special sites on a work; but the method of using a chain of wells, as shown by Mr. Elliott, should prove both economical and useful on anti-malarial work. He does not, however, allude to what may be regarded as a reverse way of getting rid of subsoil water, namely, where an impervious layer supports water and overlays a pervious stratum, it may be possible, by piercing the impervious layer, to launch the water in a downward flow *in situ*.

*Mr. ELKINGTON, in 1764, discovered the principle involved.

This might, for example, be accomplished when a gravel soil saturated with water rests upon an impervious layer of clay, beneath which is sand capable of accommodating an extra flow of water.

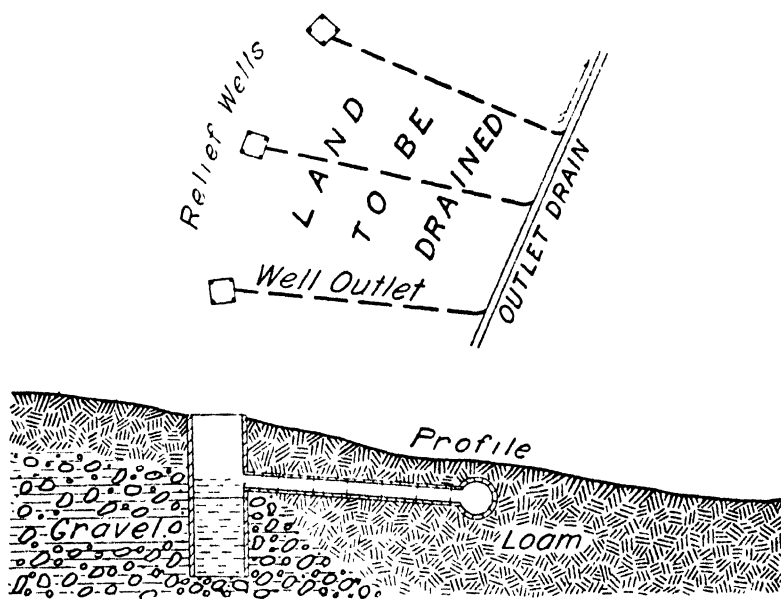


Fig. 5

DRAINAGE BY RELIEF WELLS

RELIEF OF SURFACE WATER.

The preceding note points to the fact that there must exist localities where the success of anti-malaria measures cannot be secured by attention solely to surface drainage. The value of surface drainage on systematic lines is indubitably great, and Malcolm WATSON (himself an advocate of subsoil drainage) asserts that, in the irrigated plains of Malaya, he has secured freedom from malaria in the areas treated by this method. The sanitarian must be prepared by a study of the nature of soil and subsoil of a locality, as affected by meteorological and physiographical conditions, to advise generally as to particular modes for relief of subsoil water. Take, for instance, the discussion which has been spasmodically renewed since "the sixties" as to malaria in Bengal. In the area of older formation of the delta land which is most affected, the subsoil formation must be represented by a tangle of dead and dying rivers produced by changed courses of former river beds, here obstructing flow, there facilitating it.

To advance the opinion that in such areas surface drains alone would suffice (unless cut so undesirably deep as to act as mixed surface and subsoil drains), is impracticable; an obstructed point of subsoil water discharge, on receipt of an increment of subsoil water from a distant area, would bring about water-logging, in spite of calculated surface drainage discharge.

As a preliminary therefore to offering advice, a knowledge of subsoil conditions of the locality to be treated must be obtained. When the matter is simple a survey of wells, of railways and other cuttings, the general gradient of the country and of streams forming probable discharge points, may serve the end; but, in a tangle of conditions such as may exist in old alluvial formations, especially in countries subject to seasons of heavy rainfall, the procedure must be supplemented by systematic subsoil borings. In the opinion of the writer, this well recognised method would often be greatly aided by the employment of transportable pumping plant. A recognition of the rate of lowering of the subsoil water table and, at selected points, the direction from which the chief flow occurs (when checked by observation at distant borings) would go far towards aiding discussions as to the correct localisation of subsoil drainage in a "tangle" such as alluded to. This principle the writer suggests as applicable to conditions in Bengal taking *permanent* bheels (marshy lakes) as starting points of practical methods.

It may often occur that, in an area to which surface drainage would seem applicable, the sanitarian will be "held up" in progress, by the assertion that not till the whole has been subjected to a survey for "levels" can any work proceed. The remedy for this state of affairs was pointed out by the late Sir Edmund BUCK, who maintained that valuable results could be secured by noting on maps of lands already surveyed for purposes of identifying ownership, the direction of natural flow of surface water. By steady application of this method, many useful schemes can be elaborated. In the United Provinces, these drainage maps have been employed successfully for many years (Agricultural Research Institute, Pusa 1915, Bulletin No. 53, p. 23).

But whilst concentrating the attention on the area to be treated, the sanitarian must never forget (whether the total land is small or large) that the selected point of discharge merits his careful inspection. The use of surface and subsoil drainage must affect the period of discharge, demanding consideration of breadth and gradient alike of a river or a mere ditch, and freedom from obstruction to flow from irregularities of contour or from old accumulations on silted beds.

The importance of so constructing surface drains, wherever funds will permit, that scouring shall not provide irregularities of contour of the side or beds and thus offer sites for mosquito breeding is obvious, and has lately been largely met by continuous concrete lining [see this *Bulletin*, Sanitation Number, 1916. June, Vol. 7, p. 440] or by the employment of re-enforced concrete in sections. To secure rapid and accurate work in excavating ditches, it is evident instead of trusting to hand labour the use of a machine would offer great advantages; land dredging machines have met requirements, but they are inapplicable to small surface drains. This is however no longer a difficulty, as, according to the *Engineering Record* (New York) 1916, July 29, p. 134,* there are now available oil engines working on the anchored cable principle, which can cut ditches, by means of a plough, 2 feet bottom width and 3½ feet deep. They have caterpillar wheels and, although weighing 15 tons "its large bearing surface enables it to travel over swampy land too soft to support a team."

*See also "Indian and Eastern Engineer" (Calcutta). 1916. July 29. p. 184.
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CONTROL OF SUBSOIL WATERS BY DRAINAGE.

In attempting to get a convert from the "prohibitive cost" theory alluded to (*supra*) the sanitarian will find, with the average lay member of local bodies, extraordinary ideas of the amount of subsoil water it would be desirable to remove to secure freedom from water-logging of the soil. It is well therefore to hasten to give the assurance that neither the shallow wells nor the success of agriculture need be interfered with, and that all that need be sought is that the maximum rise of subsoil water shall be *under control*—a result which is required both in in agricultural and anti-malaria interests. Frequently, the Engineer of such bodies may form a temporary adherent to the prohibitive cost theory and it is well the sanitarian should recognize that the profession so essential to sanitary advance has, as in the case of the medical profession, numerous branches. The engineer capable of designing and constructing a bridge, or reckoning strains in building material, may know little more as to subsoil water than that it is a nuisance to him when digging foundations in building operations, which has to be dealt with. Subsoil drainage properly so-called is regarded by the average engineer as a simple matter which concerns the farmer, and to him he is liable to leave its consideration. The sanitarian must therefore insist upon its importance, if he is to secure a professional coadjutor when a project is to be of large dimensions.

Should the area to be treated have much clay formation, any suggestion of subsoil drainage is apt to be put aside as unworthy of consideration. Such views however ignore the retentive capacity and its not insignificant capillarity and rest upon the unfounded opinion that clay represents an impermeable layer, and therefore can only be dealt with by surface drainage. Yet, were this correct, the farmers of the huge clay areas of Great Britain would hardly have sunk the enormous capital they have, which has resulted in improved agriculture and the disappearance of malaria. They have gone to this expense in the knowledge that, in the presence of subsoil drainage, the clay soil is rendered more permeable both to air and water. Indeed, were subsoil drainage unsuitable on clay soil, its employment in Panama to the extent of a million feet could hardly have been justified, when according to Le PRINCE "there is very little porous soil in the Isthmus, and a large part of the surface soil is of a clay-like character."

As to methods of subsoil drainage, the engineer who has delegated it to the farmer has done nothing to improve it for centuries. If TOMASI CRUDELI be right, it is due to the use of subsoil drainage by the Romans that the surroundings of the City were kept free from malaria. It was the weapon with which the French effectually dealt with malaria in Algeria in the sixties; and although GORGAS and his staff took the sensible course of using all known anti-malarial measures, including the systematic use of oiling and surface drainage, it is to subsoil drainage that the chief value is ascribed. The following are quotations from "Sanitation in Panama," by Surgeon-General GORGAS:—

"Numerous open ditches interfered with the use of a horse-mower. [And the writer would add that in agriculture their use implies loss of arable land and difficulty in ploughing and in other agricultural operations]. To meet this difficulty, the inspector used subsoil tiled drainage wherever it was feasible. *This is the ideal anti-mosquito drainage* [italics not in the original]. It carries off the water, so that there is no formation of breeding

places on the surface. After it is once laid it requires no work or expense for up-keep, and a horse-mower can be used just as freely over its surface as if there were no ditch there."

On the subject of drainage generally, Gorgas in the same work (p. 201) states :—

"It is quite feasible everywhere, by proper drainage, to eliminate entirely the anopheles mosquito, and in several of our towns and villages we succeeded in doing this, and could have done it everywhere if it had been thought desirable by the authorities to apply the same methods, which had been successful at these places, and previously at Havana."

Le Prince, the Chief Sanitary Inspector, Isthmian Canal Commission, states :—"Without doubt, proper drainage is the all-important and most effective method of eliminating malaria."

It is satisfactory to know that the use of subsoil drainage is attracting attention in the Colonies. In the Annual Medical Report for Nyasaland 1914 (p. 21), the subject is thus expressed in reference to Zomba :—

"The recent extension of the existing storm-water drains should be of value as likely to reduce the number of probable anopheles breeding places, but it will be a mistake if the scheme is not carried to completion, with some method of subsoil drainage in the marshy areas that at present exist."

In the Annual Medical Report for Nigeria, 1914, p. 80, the importance of this method is also urged :—

"Subsoil drainage is not practised to any extent, useful though it has proved to be in the few places where it has been carried out, and we are convinced that with an extension of subsoil drainage a great deal of mosquito-breeding would be prevented and a large saving would accrue from the fact that much less disinfectant and kerosene would require to be used."

CONTROL OF SURFACE AND SUBSOIL WATERS BY PUMPING.

But whilst, where sufficient fall is at disposal to a reasonably near point, the above methods of discharge may suffice, it may well happen that the limits of property and absence of facilities for discharge by gravitation leave no choice but the use of pumping, and once more the verdict of finance may be "prohibitive cost." But, again, the sanitarian should require the local data upon which the verdict is founded, and not abandon possibilities till satisfied on the point.

There are conditions under which surface drainage and its subsequent maintenance might not be able to compete in cost with pumping. For example, the Irrawaddy has a habit, as a result of periodical floods, of raising huge banks which in certain places, on retirement of the river, shut off the stream from land by dykes which may have an elevation of 30 or more feet above the adjacent country. The river has a very small gradient to the sea, in the majority of its course, and to drain an area so as to discharge into the river may mean the extension of a surface drain for miles, before a point with sufficient "fall" can be secured. Tide-valves and the like with perforation of the bank in some cases might be applicable, but the choice must often be to pump, to raise a certain portion by "filling," by hydraulic dredger from the rivers or leave the water alone. The fact is that the popular dread of cost of pumping is founded upon the legend of steam engines of the type employed forty years ago. In the present day, the centrifugal pump driven by a good type of oil engine or electrical power has entirely altered conditions. Mr. CHATTERTON, M.I.C.E., has done much in

securing the employment of oil engines for irrigation in the Madras Presidency for raising subsoil water, and in the Bombay Presidency their use is daily increasing. In a paper on "The utilization by pumping for irrigation of underground sources of water supply" (International Engineering Congress, San Francisco, 1915) C. E. P. SMITH states :—" As an example of the excellent service given by these oil engines, a heavily loaded engine has run steadily through a 14 hour day without a visit from the attendant." He advocates combination of neighbouring farmers in pumping expenses.

In a preceding note, the writer has advocated the necessity for the sanitarian to survey the country for miles round, with the object of ascertaining from its configuration the factors influencing surface and subsoil flow. But he should also keep his eyes open for *streams capable of developing hydro-electric power*, which may enable him to secure for a population at once a water supply and its means of purification (ozone), cheap pumping for anti-malarial measures, and power for Municipal* and Commercial use. *All* these dreams might not be realizable, but, even if pumping power were secured, solid sanitary advance might be forthcoming and the cost *might* not be "prohibitive." Anyway, as a practical measure pumping to relieve the subsoil water, in reference to the injurious effect of water-logging in agriculture, and at the same time to economize it for use in irrigation, is now being attempted by the Government of India, under the advice of Mr. NETHERSOLE, C.S.I., the Inspector-General of Irrigation in India. In a paper entitled, "Recent Developments of Irrigation in India," presented at the International Engineering Congress, San Francisco, 1915, he gives a sketch of a system which is in an experimental stage. The combination of interests which these efforts represent is so important that its initiation, wherever electric power is procurable, should follow.

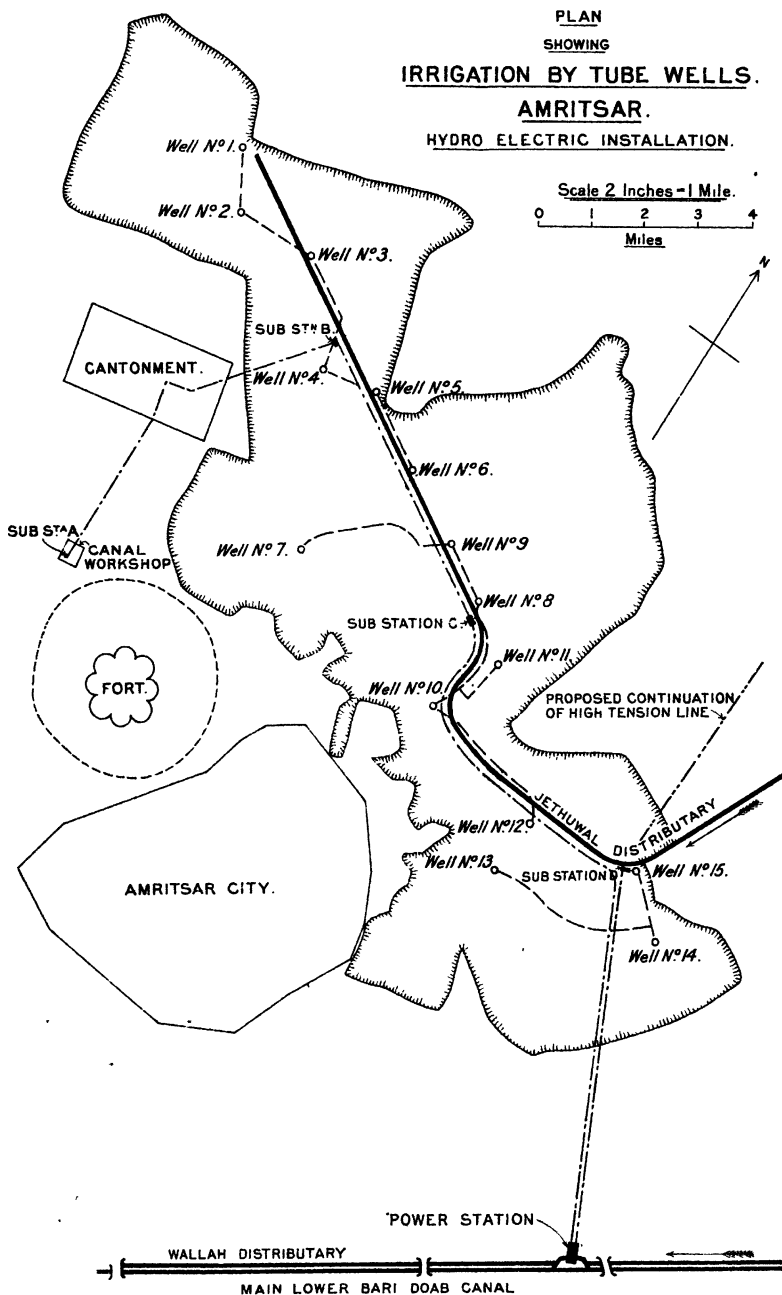
An extract from his description of the scheme, and a copy of the map which accompanied it is therefore reproduced :—

"This work which is now under construction may be referred to as the first serious attempt in this country to correct by pumping an undesirably high spring level in the soil due to excessive irrigation.

"Plate IV. shows the general scope of the scheme. The tract under treatment is in the immediate vicinity of the City of Amritsar, where, owing to the comparatively high value of the crops raised, cultivation is intense, with irrigation from the distributary of the Bari Doab Canal shown on the plan; consequently the subsoil water has gradually risen to within a few feet of the ground surface. Owing to the general low level of the tract as compared with the only available natural drainage outfall, it is not possible to attempt to lower the subsoil water-level by open or piped gravity drains, and the present scheme for reduction of the subsoil water-level by pumping is experimental in its present stage. Ample water power was available in the Main Bari Doab Canal where a masonry fall already exists at the site shown on the plan. The supply and fall sufficed for three turbines each of 270 hp., operating three-phase alternators each of 175 kilowatts.

"The power transmission line of 6,000 volts is shown on the plan; also the location of the 10 pumping stations now being installed, which have been chosen so as to conveniently discharge into the existing irrigation channels. By this arrangement existing irrigation rights will not be interfered with; the only difference being that the supply instead of being derived, as heretofore, from the Bari Doab Canal, thereby aggravating the high spring level, will be pumped from the subsoil water, thereby reducing it.

* It would indirectly afford power in a scheme such as outlined in this *Bulletin* (Sanitation Number). Vol. 6. p. 281, 1915. Sept. 15.



REFERENCES.

Line, 6600 volt 3 phase. Existing water courses

Line, 550 volt 3 phase. First area to be irrigated by tube wells.

"As the subsoil is of very fine sand, the supply will be obtained from tube wells sunk from 100 to 120 feet from ground surface. The tubes of 10 inch diameter are constructed of special copper wire of triangular section wound closely round a skeleton frame-work of steel rings and bars. The pumps are centrifugal, working on a vertical spindle at the bottom of the supply pipe, which, with the pump, is lowered into the well tube after that has been sunk; and each pump is to be worked by a 12 hp. three-phase motor. Experiments carried out during the past three years show that such a pump and tube well will yield a continuous supply of 2 cubic feet per second without clogging the tube well by drawing in the sand."

PRELIMINARY MUNICIPAL ENGINEERING AT PANAMA.

In Part 1 of "The Panama Canal" by General GOETHALS, H. W. DURHAM, as "the formerly Resident Engineer in charge of Municipal Engineering at Panama," contributes a paper on the above subject. The conditions he was called upon to remedy were such as might be expected in dealing with old towns in any tropical area, where the *fiat* has suddenly gone forth that *radical* improvements are to be effected. The paper is therefore of interest from the sanitary point of view, with regard to the selection of methods and materials, in order of precedence as to sanitary requirements, under conditions that implied, at times, that one or other should be "makeshift."

The main and worthy intention of the paper, however, is obviously to put on record the work of men who laboured through the difficulties of the pioneer stage of Panama Canal construction, but who, their work accomplished, are apt to be forgotten. This, at first sight, would seem to be peculiarly the fate of pioneer workers in the tropics. The majority sacrifice themselves at the altar of duty, unheard of and unsung. To men thus infatuate the certainty that they are but atoms in the ever changing conditions of life, matters little. Still, Mr. Durham performs a graceful act in asking, in the following sentences, the survivors of a great sanitary and engineering victory to remember those who have fallen in the struggle:—

"Those on the Isthmus for this period lived and worked in conditions very different from any prevalent since then, or described in accounts of canal work. Comfortable screened houses with furniture, plumbing and electric lights; commissaries, supplied with cold storage; communication between settlements by good roads, club houses, excursion trains, sanitarians and other luxuries which have made the Panama towns the wonder of the swarms of tourists that have visited the zone in perfect safety and comfort;—these could only come after the labours of the advance guard who worked between and during malarial fever attacks, who saw companions daily carried to the hospital, and kept note of the increasing rows of white crosses in the burial ground and of the piles of pine coffins turned out by the carpenter shop as a side line to keep ahead of the demand, while their wives were living in rooms unscreened because requisitions were delayed, and meanwhile checking American funerals as they passed by, noting the flag-draped coffins."

But the Anglo-Saxon blood of the American in the Panama recognised no downheartedness, and Mr. Durham records that, notwithstanding the havoc of sickness and death, *esprit de corps* was so high, in branches of the Municipal Engineering Department, that "rival groups would race to working sites with the object of prompt fulfilment of work." Specification for materials suitable for the tropics "and following the usual methods extant" were forwarded to the purchasing agents

Washington. These were required "for the quick settlement of the water famine problem for the ensuing year, but serious delays were caused by academic debates on the part of certain authorities as to whether Pacific Coast specifications were inferior to those of New England." To meet urgent difficulties as to labour men were imported—for whom food and quarters were necessary—but "the Paymaster Department absolutely refused to make any advance until wages had been earned." The equipment of the Sanitary Engineering Department for Panama City consisted of teams, wagons, scrapers, ploughs, road rollers, etc. Indents were however not synonymous with supplies. In illustration of difficulties of central management, he records "after a long wait," the arrival of two rollers. "They presented a handsome appearance with fresh gold lettering," showing the name of a certain Company. Only locomotive engineers "discharged from the local railway for undue thirstiness were available to run them." Within a few days however

"the large gear wheel on one roller broke in two, displacing a section of rust on the interior face of the break, which had been covered with putty and paint. Shortly after, the link block on the other cracked and, when removed, showed, under its coating of metal paint, an unmistakable hardwood surface. As the new paint began to wear off the covers, other names developed beneath it, which led to a belief that both machines were reconstructed traction engines."

"Materials were seldom promptly available to complete work as planned. Division heads were frequently hampered by office methods designed for conditions nearer home. As an instance, it was necessary for a long time that each division have its own stores, to avoid their exhaustion by others, and the spectacle was presented of the Municipal Engineering carpenters spiking together 3- by 12-inch planks to make 12- by 12-inch posts, while less than half a mile away the saw mill of the building department was ripping 12- by 12-inch timbers into 3- by 12-inch stuff."

Water Supply.—The local authorities of Panama City had decided to secure a water supply from the Juan Diaz River, distant ten miles. Local vested interest supported this scheme. This would have given a constant supply, but at a prohibitive cost. Meanwhile, the abolition of receptacles for storage of water, or incidentally so acting, was urgently pressed by the sanitarians of the Canal Department, in respect to suppression of yellow fever and malaria. It was found that the French had made a dam in the neighbourhood of Culebra on the small stream called the Rio Grande, from which the water supply of neighbouring encampments had been arranged. The decision to use this source was arrived at, "because, while the latter [Juan Diaz source] was situated at a distance of ten miles from the Canal line, the Rio Grande supply was not only within the Canal Zone but immediately adjacent to the line of the Canal near its highest point, and could be used to furnish water, not only for Panama City proper, but for all towns on the southern slope of the divide, or nearly one-third the Canal route."

As the next step, it was ascertained from the Sanitary Department that this source was from a bacteriological and chemical point of view "an entirely proper source of supply." It is not however said that this opinion included the results of a sanitary survey of the source, nor that such survey was undertaken as a preliminary to any decision as to selection of a source, as should undoubtedly be the rule, but it is

presumable this essential point was not neglected.* The final plan, as approved, showed that at Rio Grande, there should be a storage reservoir served by a 16-inch pipe extending to Ancon, where the service reservoir to contain 1,000,000 [U.S.] gallons was to be located. This reservoir was divided by a central wall into two parts. From this latter point, the distribution system to the Panama City was laid down. No filtration was held to be necessary in 1904, but according to Mr. WELLS [vide foot note] by 1906 filters of the "Continental Jewel" type were installed, on additions of water from other sources being found requisite.

Pipes were not forthcoming with the necessary quickness, and the Engineer adapted "main galvanized rivetted wrought-iron pipes of 20-inch diameter which had been intended by the French for use with hydraulic dredges. The pipe in sections of 16 feet has flanged ends. Connection was made by bolting the flange through rubber gaskets to ensure tightness, and, as a precaution against drainage, the pipe was laid surrounded with 6-inch concrete." This was certainly a makeshift pipe, and it would be interesting to ascertain how far it has stood the test of time. In crossing valleys either bridge abutments or trestles were used for supports. Nothing is said as to use of air, break pressure or scouring valves.

It is noteworthy that as fast as the houses were connected with the service water system and sewers, the Sanitary Department "required the filling up of wells and cisterns and the removal of water containers."

Sewerage.—It was resolved to carry out the sewerage and water-supply distribution simultaneously. Irrespective of any sanitary advantage thus secured, this was regarded as a matter of convenience in respect to minimized disturbance of roads and water pipes.

It was determined to employ direct discharge to the sea for disposal. The tidal rise is from 14 to 20 ft. The City is surrounded by an ancient wall and, outside this, the beach was rocky in some places and sandy in others, "over which the water extended for a distance varying from a few hundred feet to half a mile." This dictated the advisability of not trusting to a single large and impervious main sewer for discharge.

"It was seen that, while no nuisance would be occasioned to the city by the discharge of sewage into the bay with its strong tidal currents, it would be necessary to place the outlets at low water mark to avoid any pollution of the beaches, and it therefore became requisite to find suitable points for outfalls, the location being governed, both by the drainage area to be served, and the possibilities of constructing an outfall sewer in a permanent manner, across the strip of territory exposed at low water. Inspection of the map, and of physical conditions at low water mark, showed three points where high and low water marks were reasonably near together, while the shape of the city rendered its division into three drainage areas most suitable. . . . These points being decided upon, and a line of intercepting sewers reaching to each outfall being laid out at the maximum available grade, the remaining task consisted of planning a series of sewers in the three districts named, which would reach these interceptors with a minimum size and quantity of pipe."

*[In a paper by G. M. WELLS on "Municipal Engineering and Water-Supply," also included in Part 1 of "The Panama Canal," it is stated, "The Rio Grande watershed was uninhabited and was made a reservoir, so that the possibility of contamination was eliminated."]

The discharge calculated for was 60 gals. per head, an amount which, even allowing for the difference of the U.S. gallon is, in European ideas of water use and abuse, large. This having been arrived at, there remained the question as to what, if any, storm water was to be received. It was decided to accept "an estimated run off over the entire area of 2 inches per hour, with the exception of those streets within one block of the sea wall where all waters would be allowed to run off on the surface."

Local knowledge must be allowed largely for in evaluating the conclusions arrived at for selecting a combined system. It may be granted that a combined system in a country subject to heavy tropical rainfall would not, in the present day, be lightly elected. Leaving out of question the maxima rainfalls, the Ancon register (p. 238 "The Panama Canal") shows that in the 33 years of which there are records, for the first quarter of the year, the rainfall did not amount to a total of one inch in the months of January and February on 12 occasions and, in March, on 11 occasions; so that for the majority of days during the first quarter of the year the sewers were of a size far beyond requirements. In view of this disadvantage and the admitted probability of "backing up" of domestic drains, the deciding factor seems to have been that since the "combined system was very much less expensive than a separate system and the narrow streets made it inexpedient to lay duplicate lines of pipe, this plan was thought to be more desirable from all points of view, and subsequent experience justified it."*

If, in absence of local knowledge, it is legitimate to use only the evidence afforded by Mr. Durham, the writer thinks that too much stress was probably placed upon the two items in the argument, (a) the expense, and the supposed necessity of (b), duplicating mains throughout in the narrow streets. It does not follow that in dealing with tropical rainfall a separate system need be more expensive than a combined system, nor that duplication of mains for a separate system need occur solely in narrow streets. Having, as in this case, at least three points of discharge at disposal, the chances always are that a selection of points of collection of surface drainage would have got rid of this undesirable method.†

Roads.—That there was reason to dread interfering at depths with the subsoil of narrow streets is, however, shown by the fact that while constructing one of the sewers "it was necessary to keep a gang at work continuously for two days in order to protect the sides, shore the adjacent buildings and prevent damage."

Nevertheless, at certain points,

"as labour was cheap and unskilled, it was decided to make sewer manholes of concrete, and, on account of the firm nature of the material excavated, a large number of these were constructed by digging a circular hole of the exact size of the manhole in advance of trenching, thus avoiding the necessity for exterior forms. While awaiting the arrival of supplies and subsequently on various occasions when these were inadequate several concrete sewers were constructed."

*It is probable this opinion is not fully accepted. Mr. Wells (p. 164 "The Panama Canal" by General Goethals") states:—"In the city of Colon, a separate system was installed in the beginning, and in general has given better satisfaction than the combined systems in Panama and in the towns along the line of the Canal."

†At p. 184 of this *Bulletin*, No. 3, Vol. 5 (Sanitation Number, Feb. 28), 1915, the writer discusses certain methods of meeting difficulties.

The streets were paved with materials selected in accordance with their importance and nature of traffic. For the chief streets vitrified brick was laid, supported on a one inch sand cushion upon five inches concrete. In minor streets, 5-inch concrete roadway with a smooth surface were constructed without a layer of bricks. Where bricks were laid, cement gravel was employed with satisfactory results. Much of the brick received for paving was in a broken condition. This was used by "mixing both broken stone for formation concrete."

This would seem an incompatible mixture. The engineer in India would probably have utilized the broken brick for making *soorkhi* (puzzolama), which with hydraulic lime is no mean substitute for cement.

"The paving of the city was continued throughout 1906, being finished early in the following year, and amounted to a total of 65,000 square yards of brick pavement with a total length of $5\frac{1}{4}$ miles, about two-thirds of this on concrete foundation and the remainder on macadam. There was also laid about 19,000 square yards of concrete pavement, having a total length of two miles. Concrete curbs were built on all streets."

REINFORCED CONCRETE.

For wells.—In this *Bulletin* [Sanitation Number, Vol. 5, No. 3, p. 188] "pot" wells as used by the people of India (that is, wells lined with earthenware rings) were described. Their prototype is found in the glazed stoneware well rings sold by manufacturers. In his paper on the "Utilization by pumping for irrigation, of underground sources of water supply,"* G. E. P. SMITH refers to the use of rings of reinforced concrete for the lining of wells. It is evident that in many parts of the tropics the method would be peculiarly convenient in reference to transport difficulties. It would be an unusual locality which could not furnish men capable of digging within the ring of a descending curb. The matter would resolve itself into transport of bags of cement and iron material for reinforcement, and the provision for supervision of at least one man skilled in dealing with concrete and well sinking. †

For houses.—At the last Engineering Conference in Rangoon† Mr. G. CLARKE, Executive Engineer, D.P.W., read a paper on reinforced concrete, showing a mode of utilizing this material which the writer thinks should be useful not only as an economy for wood, as shown to be the case in Burma, but for semi-permanent houses and hospitals generally. Mr. Clarke is reported to have stated:—

"In Burma, houses with timber frame-work filled in with brick nogging have been the rule rather than the exception. In the past, in a Province where wood is of such good quality and used to be cheap, this form of construction was eminently suited to the conditions. Timber has now, however, greatly risen in price, and it has been found no longer possible to provide adequate accommodation in all instances at a cost within the limits prescribed. In this instance the usual timber posts, girders, wall plates, and quarterings were replaced by reinforced concrete with excellent results."

* Paper read before the International Engineering Congress, San Francisco, 1915.

† Indian Engineering, 1916. May 27.

LANDS AND BUILDINGS.

OCCUPATION OF NEW SITES.

It is not often that it falls to the sanitary authorities in Europe to make plans for a hitherto unoccupied site. Their labours are chiefly concerned in acquiring portions of land and old buildings which, in the aggregate, suffice for effecting improvements. This must remain the rôle in dealing with older countries of the tropics, but as commerce advances extensions of old towns, or assumption of new sites, must follow. But, in the more recently acquired British possessions, the construction of railways and means of traffic on waterways must often give the opportunity of dealing with new sites. Few public bodies, however, yet realize the importance of all sanitary details as to occupation of a new site being thoroughly "worked out" prior to occupation. To stake a place out for roads and allot house sites for purchasers, and perhaps to dictate as to the class of house allowable within certain areas, has in the past often been the sum of effort. As to water supply, possibilities may have been ascertained but both this, conservancy, drainage and sewerage are matters which at times strike public bodies bent on economy as capable of attention, when the numbers of inhabited houses justifies the expenditure. In the absence of rulings to the contrary the expiry of six months may find, by purchase and transfer of plots of land, all hopes of planning *in the interests of sanitation* gone. According to the Annual Medical and Sanitary Report for New South Wales for 1913* it has been ruled that no owner of land may proceed to erect a building upon it without giving due notice of his intention; moreover all places of intended building must be vised by the Medical Offices of Health of the area concerned.

*New South Wales, Report of the Director General of Public Health, 1913. pp. 9 & 16.

TROPICAL DISEASES BUREAU.

TROPICAL DISEASES
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[No. 6.]

PELLAGRA.

LAVINDER (C. H.). **History of Pellagra.—Certain Salient Points.—**
Southern Med. Jl. 1916. Apr. Vol. 9. No. 4. pp. 324-325.

A short account of the history of pellagra. The earliest observations on this disease were made in Spain by Gaspar CASAL who gave a good description of its general symptomatology. He attributed the malady to atmospheric conditions and poor food. The author draws attention to the interesting fact that throughout all the literature of pellagra, both early and late, there runs the idea that the disease is in some way dependent on a poor diet. This point of view has been substantiated by recent work, and though the exact part played by diet is still unknown, yet the etiology of the disease is most likely to be cleared up by experiments conducted from the dietetic standpoint.

H. Maclean.

SILER (J. F.), GARRISON (P. E.) & MACNEAL (W. J.). **Introduction to the Third Report of the Robert M. Thompson Pellagra Commission of the New York Post-Graduate Medical School and Hospital.**
—*Arch. Intern. Med.* 1916. July. Vol. 18. No. 1. pp. 1-3.

A short account of the constitution, investigations and results of the Pellagra Commission of the New York Post-Graduate Medical School, since it began its studies of pellagra in 1912. This Commission has come to the conclusion that pellagra is an infectious disease, and claims that their earlier work has been confirmed by subsequent investigations; they reject with scorn "the ancient theory of dietary deficiency again exploited by Sandwith and others in the recent literature" and state that it is their purpose to present in this third report those portions of their recorded observations "which seem to have the most important bearing on the unsettled problems of pellagra." This report contains the two following papers contributed by Dr. DEVONPORT and Dr. MUNCEY. A list of references to the publications of the Commission is appended.

[Though the etiology of pellagra is still unknown, "the ancient theory of dietary deficiency" or, at any rate, the fact that ill-assorted diet plays the chief part in the etiology of the disease, is gradually

gaining acceptance. It is not clear why the authors refer to one of the very latest theories—the deficiency theory as advanced by Dr. SANDWITH and others—as an “ancient theory.” It is only within the last few years that we have really recognized “deficiency diseases”].

H. M.

DAVENPORT (C. B.). **The Hereditary Factor in Pellagra.**—*Arch. Intern. Med.* 1916. July. Vol. 18. No. 1. pp. 4–31. With 38 figs.

MUNCEY (Elizabeth B.). **A Study of the Heredity of Pellagra in Spartanburg County, South Carolina.**—*Ibid.* pp. 32–75. With 28 figs.

Two papers forming a part of the third report of the Robert M. Thompson Pellagra Commission of the New York Post-Graduate Medical School and Hospital. In the first paper the author discusses the question of heredity as a factor in pellagra; he treats the problem from various points of view and, on the evidence available, comes to the conclusion that the term pellagra is applied to various “inflammations and ulcerations of the musculovascular layer of the skin and intestine, doubtless due to the presence of a toxic agent which also induces in predisposed persons nervous and mental disturbances. The differences in the degree of expression of these symptoms are due, among other things, to differences in the hereditary constitution of the affected individuals, and variation in the symptom complex is due to variations in the constitutional, or hereditary, susceptibility or resistance of the different organs affected by the toxin.”

The fact that a high incidence of pellagra obtains among blood relatives may be due to infection through close personal contact, or it may be the result of constitutional similarity. The author believes that the evidence suggests that both factors play a part. He contributes a good deal of evidence in favour of the view that the disease is communicable, and is a strong advocate of its infective nature. The majority of the observations in the paper seem to be based on statistics furnished by Dr. Muncey and referred to in the second paper. The conclusions arrived at are as follows:—

“Pellagra is not an inheritable disease in the sense in which brown eye colour is inheritable. The course of the disease does depend, however, on certain constitutional, inheritable traits of the affected individual.

“Pellagra is probably communicable, but how the communicated ‘germ of the disease’ shall progress in the body depends, in part, upon constitutional factors.

“When both parents are susceptible to the disease, at least 40 per cent., probably not far from 50 per cent., of their children are susceptible; an enormous rate of incidence in a disease that affects less than 1 per cent. of the population on the average. While the high incidence is doubtless due to infection, it is also doubtless due to susceptibility, for right among the affected children grow up brothers and sisters who have never shown the symptoms of pellagra. We can understand this on the ground of inheritable differences in constitution of the children, just as brown eyes and blue eyes occur in the same family.

“The importance of the constitutional factors is evinced by the difference in the reactions to the toxin of the disease shown by different families. Many families never show mental symptoms, while others usually do. In some families the intestinal symptoms are slight or negligible; in others severe and associated with early death. In some families the skin

eruptions amount to little; other families are characterized by severe ulceration and desquamation of the derma. These family differences have all the characteristics of biotypes or blood lines, and afford the best proof that there is, indeed, a hereditary factor in pellagra."

In the second paper, which deals with the same problems, it is stated that the field of research was limited to Spartanburg County, South Carolina. The author admits that several of the conditions more or less essential for a successful study of heredity in any disease were absent in the locality chosen for the investigation, but presents the carefully sifted data of eight months labour with the hope that it may help to establish a foundation for future study. The conclusions arrived at are summarised as follows :—

"An analysis of the data collected shows no evidence of direct heredity. There may, however, be an hereditary predisposition to the disease in those families in which chronic gastro-intestinal symptoms have existed for several generations. The relatively high proportion of gastric and intestinal diseases among pellagrous families would seem to substantiate this hypothesis. Of the 105 families in which there is only one case of pellagra, only three give history of intestinal or skin diseases in the ancestors, and only one gives history of antecedent insanity. With this predisposition to the disease, direct contact or life in endemic sections might be the exciting factor necessary for its development."

At the end of the papers a number of charts and abstracts of family histories are given, which serve to show the manner of studying family groups.

H. M.

SILER (J. F.), GARRISON (P. E.) & MACNEAL (W. J.). **The Incidence of Pellagra in Spartanburg County, S.C., and the Relation of the Initial Attack to Race, Sex and Age.**—*Arch. Intern. Med.* 1916. Aug. Vol. 18. No. 2. pp. 173–211.

An extensive investigation of the points indicated in the title. The scope of the work and the results obtained are best given in the authors' own summary, which is as follows :—

"1. The number of recognized incident cases of pellagra in Spartanburg County has increased progressively each year since 1907, very rapidly to 1911 and at a less rapid rate to 1914.

"2. The death rate in year of initial attack was 15·8 per cent. for the total 1,180 recorded cases. There is no definite indication of a progressive change in the death rate in recent years, although it was apparently higher previous to 1911.

"3. The disease has attacked the white race more than the negroes in this county, but in recent years there has been a slow but progressive increase in the ratio of incident negro pellagrins to incident white pellagrins.

"4. The death rate in initial attack has been 41·8 per cent. for negroes and 12 per cent. for the white race.

"5. Pellagra was very rarely observed under the age of one year. It was not so rare in the second year and fairly common in the age period from 2 to 12 years. The death rate in initial attack has been low in children.

"6. Evidence of residence very close to an antecedent pellagrin has usually been quite clear in the cases of infantile pellagra.

"7. The milk of pellagrous mothers cannot be regarded as the cause or the vehicle of the cause of pellagra in infants.

"8. The age period 12 to 16 years is relatively free from initial attacks of pellagra.

"9. After age 16 years pellagra incidence rises rapidly in women and the rise is especially sharp in coloured women. In the latter group the death rate has been high, 46·7 per cent., in year of onset in the age period 16 to 20 years.

"10. From age 20 to age 50 years, the number of women attacked by pellagra gradually diminishes and the number of men attacked gradually increases, so that the two sexes are approximately equal in this respect at age 50. In old age the onset of pellagra has been slightly more common in men in this population.

"11. The death rate in first attack in white women over 20 years of age has been 11.9 per cent., increasing progressively from 4.6 per cent. in the third decade to 47.6 per cent. in the seventh decade of life. The death rate for analogous groups of white men, coloured women and coloured men has been 21.2 per cent., 40.2 per cent. and 50 per cent., respectively, with a slight tendency for the death rate to increase with age in all groups.

"12. Pellagrins with onset under the age of 12 years were only 3.7 per cent. of the total recorded cases previous to 1910, but the proportion has increased to 29.7 per cent. of the total recorded onsets in the year 1914. These observations corroborate the other evidence of a distinct progressive increase of pellagra in this county in recent years.

"13. The incidence per 10,000 population has been 231 for white female population, 103 for white male, 81 for coloured females and 25 for coloured male. In the age period 10 to 14 years the incidence is low in all groups. In white female population it is highest in the age period 30 to 34 years, namely 535 per 10,000; in white male, in the age period 55 to 59, namely 325 per 10,000; in coloured female 241 per 10,000 in age period 30 to 34; in coloured male 133 per 10,000 in age period 60 to 64.

"14. The lower incidence rate and the higher death rate for those attacked have occurred in negroes in conjunction with greater poverty of this race and a diet poorer in quality, quantity and variety. Incidence has been lowest in the sex and age groups of negroes most completely segregated from white pellagrins."

H. M.

JOBLING (James W.) & PETERSEN (William). The Epidemiology of Pellagra in Nashville, Tennessee.—*Jl. Infect. Dis.* 1916. May. Vol. 18. No. 5. pp. 501-567. With 23 charts.

The results of a most minute and exhaustive investigation into the epidemiology of pellagra in the city of Nashville. The following conclusions were arrived at:—

"A few cases of pellagra were probably present in Nashville in 1891, but the disease did not become prevalent until 1908. About 65 per cent. of the cases found in the survey developed during 1914 and 1915. Approximately 89 per cent. of the pellagrins developed the disease while residing in houses which were not connected with sewers, and 95 per cent. of these had unscreened vault or surface privies in close proximity to the house. Only 2 per cent. of the houses were screened. The typhoid incidence corresponds with that noted for pellagra.

"More than 78 per cent. of the patients had associated with other patients before they developed the disease. Thus, 33 per cent. of the pellagrins developed the disease in houses which contained other cases, while in most of the remaining instances there were patients in the adjoining houses or within the same block with whom they constantly came in contact.

"The water used was derived from various sources; it can therefore hardly be considered an important factor in the development of the disease.

"White and coloured races appear to be equally susceptible. More white people than coloured people develop the disease in the spring. The reverse holds true for the summer months. The mortality appears to be greater in the negro race. Relatively few cases were found among negro children.

"Individuals from 10 to 20 years of age are less susceptible than at any other period of life. Women 30 to 50 years of age are from three to four times more susceptible than men. Over 50 years and under 10 years,

both sexes are equally susceptible. In the rural district surveyed, more men than women were affected.

"The diet contains an excess of carbohydrates, but 68·8 per cent. of the patients gave histories indicating that they were consuming proteins in considerable excess of 40 gm. a day, an amount which has been shown to be sufficient to sustain life without the development of pellagra."

H. M.

PERDUE (E. M.). *La pellagra negli Stati Uniti*. [Pellagra in the United States.]—*Ann. d'Igiene*. 1916. May 31. Vol. 26. No. 5. pp. 310–316. With 3 plates.

The author, who is Professor of Tropical Medicine in the Eclectic Medical University, Kansas City, Missouri, is an adherent of ALESSANDRINI and SCALA's theory that the cause of pellagra is a chronic acid intoxication due to the absorption of colloidal silica in the drinking water. In this paper the geographical distribution of pellagra in the United States is fully described and the geological origin of the drinking water in the different districts of the States analysed.

In the pellagrous districts are found rocks which have a high content of silica and alumina and are poor in alkali. The author's conclusion is that the rivers of districts in which pellagra is unknown are characterised by a hard drinking water—thus in Iowa, Michigan, Ohio, Minnesota, Nebraska and Indiana, which are immune from pellagra, the calcium content of the water is from 40 to 70 parts per million, while in Tennessee and Kentucky, which may be considered as partially pellagrous districts, the calcium content varies from 19 to 28 parts per million; in the pellagrous zone (including Alabama, North Carolina, Georgia, Virginia, Mississippi and South Carolina) the calcium number falls to as low as from 4 to 14 parts. The statement is made that the treatment of the disease with trisodium citrate has given good results. The geographical distribution of pellagra, the death-rate from the disease and the physical geography of the districts are illustrated by a series of plates.

H. M.

PARRISH (E. Mack). *Epidemiology of Pellagra*.—*Texas State Jl. Med.* 1916. Aug. Vol. 12. No. 4. pp. 177–179. With 1 chart.

The author refers to two epidemiological features of pellagra, (1) that the disease is essentially rural and (2) that it is associated with poverty, and enquires what difference there is between the element of poverty in city slums and in country districts. To this question he replies that one important difference is that of *soil infections*. Hookworm disease and pellagra are commonly associated, and the cause of the hookworm infection is acknowledged to be the soil; the analogy in the prevalence and spread of pellagra to that of hookworm disease suggests the idea that pellagra is also a soil disease which originates and spreads in the same way.

[This paper, which was read to a medical society, was followed by a discussion in which various theories as to the etiology of pellagra were advanced; it is perhaps worth noting that the diet theory was rejected by all the speakers.]

H. M.

BEALL (K. H.). **Pellagra.**—*Texas State Jl. Med.* 1916. Aug. Vol. 12. No. 4. pp. 170-173. With 1 chart.

A general description of the prevalence of pellagra in the United States. The disease made its appearance in America about 1907 and rapidly progressed, so that in 1908 considerable numbers of cases were reported. At the present time the author estimates that there are at least 150,000 pellagrins in the United States alone. As usually occurs when a disease invades a virgin country, the type was for years more virulent and fulminating than in Europe, but even now its virulence is being modified and acute cases are becoming rarer. While in Europe the malady is practically rural, the American disease differs in that one third of the cases occur in towns and cities. In Europe the disease is almost exclusively limited to the poorer classes, while in America, on the other hand, people in all walks of life have been attacked and only one half of the total cases occurs among the poor. GOLDBERGER's theory that the disease is dependent on deficient diet is discussed sympathetically but with a good deal of scepticism, the author concluding that the cause of pellagra is not yet known.

H. M.

WINFIELD (James Macfarlane). **Pellagra. A Clinical Report on the State of New York.**—*New York Med. Jl.* 1916. June 3. Vol. 102. No. 23. Whole No. 1957. pp. 1076-1078.

From the limited number of reported cases, it might be supposed that pellagra is rare in New York State and the immediate vicinity. The author, however, thinks that the number of pellagrins in this part is greater than the reports of the physicians indicate, and explains this anomaly on the ground that the disease presents such varied clinical symptoms that it sometimes goes unrecognised. In support of this view he furnishes particulars of eight indigenous cases of pellagra which came under his notice in various parts of the State since 1911. As far as could be ascertained, none of these patients indulged to any great extent in meat. One lived for years on beans, oleo-margarine and tea-biscuits.

H. M.

BALP (S.). **Uso del mais guasto e probabile assenza di pellagra nel Brasile.** [The Use of Spoilt Maize and the Probable Absence of Pellagra in Brazil.]—*Riv. Pellugrol. Ital.* 1916. Jan. Vol. 16. No. 1. pp. 4-8.

The author refers to Professor PERACCINI's publications on the use of spoilt maize in Brazil, where there is an almost entire absence of pellagra. The opinion is expressed that while it is not possible to contract pellagra without maize feeding, the consumption of maize is not necessarily followed by pellagra; the author believes, however, that maize creates a kind of predisposition to the disease and that spoilt maize is poisonous to an organism already prepared by a previous maize diet.

From the results of an enquiry made by Dr. BUSCAGLIA amongst various medical men in Brazil the author concludes that :—

(1) Pellagra is rare in the States of S. Paolo, Guatapara, Santa Veridiana and Martinho Pradho.

(2) Maize does not form the staple diet in these states but the diet is a mixed one and includes animal flesh, eggs, milk, other cereals and vegetables.

(3) Alcohol is much used but it is made from cane sugar and not from maize.

(4) The use of spoiled maize is not excluded but is exceptional. The author refers to a suggestion made by Professor PERACCINI that the absence of certain moulds (*Penicillium glaucum*, *Aspergillus fumigatus*, *Aspergillus fluorescens*) may explain the freedom of Brazil from pellagra, notwithstanding the consumption of spoilt maize.

H. M.

ANTONINI (G.). **Istruzioni e consigli per la lotta contro la Pellagra.**

[An Account of the Measures taken in the Struggle against Pellagra.]—*Riv. Pellagrol. Ital.* 1915. Nov. Vol. 15. No 6. pp. 92-93; 1916. Jan. Vol. 16. No. 1. pp. 12-14; Mar. No. 2. pp. 26-28; May. No. 3. pp. 39-41.

The author gives a general historical review of the various theories which have been advanced with regard to the etiology of pellagra. He divides these into classes : those in which maize plays some part and those from which maize is entirely excluded.

The author's own opinion is that the relation between maize-feeding and pellagra has been completely established. In 1900, an enquiry was made by him into the condition of the maize consumed in the 20 different provinces in which pellagra was most abundant. In 13 of these he found that spoilt foreign maize was eaten, and in all of them the conditions of milling were very bad and highly favourable for the development of moulds in the grain and flour.

These results are urged in support of LOMBROSO's theory of intoxication. The success of the prophylactic measures carried out in Italy, which were based on the intoxication theory, are brought forward as evidence in favour of the same theory.

In July 1902, a law for the prevention of pellagra was passed which prohibited the sale of spoiled maize, and amongst other measures provided for the establishment of desiccating places and for the free distribution of salt to pellagrous families.

The number of pellagrins fell from 72,925 in 1899 to 36,329 ten years later ; the mortality diminished and the frequency of insanity among pellagrins was less.

The tests adopted for the recognition of spoiled maize are fully described.

The importance of the improvement of rural hygiene as a prophylactic measure is also discussed.

H. M.

RONDONI (Pietro). Alcune considerazioni sulla pellagra, la sua eziologia e la sua prevenzione e cura. [Some Considerations on the Etiology, Prevention and Cure of Pellagra.]—*Riv. Pellagrol. Ital.* 1916. Vol. 16. Jan. No. 1. pp. 1-4.

Discussing the etiology of pellagra, the writer states that pellagra is predominant in countries where maize is largely used in the diet. There are, however, cases of pellagra in which maize plays no part, but even these can be traced to defects in diet. The large incidence of pellagra in America is the result of a diet too rich in carbohydrates. The disease nearly always attacks people who eat monotonous diet. It is extremely rare in sucking babies. In its first stages pellagra tends to disappear under the influence of good and varied diet. Maize contains protein with a structure different from animal protein; certain amino-acids are scarce while others are too abundant. The nutritive value of maize is therefore low and in order to furnish the necessary amount of utilisable nitrogen, the grain must be consumed in enormous quantities. This results in fermentation and subsequent indigestion so that maize eaters are often badly nourished and subject to dyspepsia. In guinea-pig experiments maize produces disease, in consequence of which the guinea-pigs die in a few weeks. This is probably due to the lack of vitamins. On the whole the author inclines to SANDWITH'S theory of deficiency being the principal etiological factor in pellagra.

H. M.

ALPAGO-NOVELLO (Luigi). Sulla prima introduzione del grano-turco e la prima comparsa della pellagra nel Veneto, nella Lombardia e specie nel Bellunese. [On the Introduction of Maize and First Appearance of Pellagra in Venetia, Lombardy, and especially in Belluno.]—*Riv. Pellagrol. Ital.* 1915. Aug. Vol. 15. No. 4. pp. 55-60; Sept. No. 5. pp. 70-71; Nov. No. 6. pp. 85-92.

The cultivation of maize in Italy is ascribed to the beginning of the 16th century; according to LUSSANA, the first cases of pellagra appeared in Lombardy and in Venetia at the end of the 18th century. This leaves an interval of a century and a half between the introduction of maize and the appearance of pellagra. The present article surveys the evidence as to the date of the latter event and concludes that it is considerably prior to that given by LUSSANA. The evidence as to the kind of grain used in making flour in previous centuries is also considered.

The author argues that if the appearance of pellagra is contingent on the introduction of maize, a considerable period of time must necessarily intervene between the introduction of the grain and the recognition of the disease.

H. M.

CALVERT (J. T.). A Case of Pellagra.—*Indian Med. Gaz.* 1916. July. Vol. 51. No. 7. p. 241. With 1 coloured plate.

A description of a case of pellagra occurring in a Hindu in Kishengunge Town, Purneah District, India. An interesting point about the case is the fact that the patient had never eaten maize. An excellent coloured plate of the skin lesions accompanies the article.

H. M.

GOLDBERGER (Joseph). Pellagra: Causation and a Method of Prevention. A Summary of some of the Recent Studies of the United States Public Health Service.—*Jl. Amer. Med. Assoc.* 1916. Feb. 12. Vol. 66. No. 7. pp. 471-476.

A discussion of the results of experiments on pellagra already described in the Bulletin.* The author claims to have proved definitely that pellagra is the result of a deficient or ill-assorted diet, and believes that the only treatment for the disease is dietetic. The available data are not sufficient to furnish any definite evidence as to the exact nature of the mechanism involved in causing or curing the disease; the important point is, that pellagra results from a fault in the dietary and can be prevented or cured by including in the diet suitable amounts of leguminous protein substances and fresh animal food.

H. M.

MACNEAL (W. J.). The Alleged Production of Pellagra by an Unbalanced Diet.—*Jl. Amer. Med. Assoc.* 1916. Mar. 25. Vol. 66. No. 13. pp. 975-977. With 3 figs.

A letter from Dr. MacNeal to the Editor of the *Journal of the American Medical Association* in which he discusses Dr. GOLDBERGER's alleged experimental production of pellagra as the result of feeding with an unbalanced diet. Attention is drawn to the fact that the first account of the experiments appeared in a newspaper—the *Jackson Daily News*—but here no definite description of the symptoms from which these alleged pellagrins suffered was furnished. Dr. MacNeal also quotes Dr. GOLDBERGER's account of the experiments published in the *U.S. Public Health Reports* in which the statement occurs that "the dermatitis was first noted between September 12th and September 24th, 1915, or not later than five months after the beginning of the restricted diet" and asks why Dr. GOLDBERGER made no mention of his discovery to the National Association for the Study of Pellagra which met at Columbia on October 21st and 22nd, 1915. This meeting, which was attended by Dr. GOLDBERGER, took place approximately one month after the appearance of the dermatitis and Dr. MacNeal enquires why the cases were not submitted for diagnosis to several experts present at the meeting. Other points regarding the importance to be attached to certain scrotal lesions observed in these cases are discussed. The general tenor of the letter is to cast doubt on the correctness of the diagnosis of pellagra in these cases. It is asserted that the claim and conclusion of Dr. GOLDBERGER, that pellagra developed in these six convicts, lacks the support of any reliable published evidence and a warning is given that the claim that pellagra has been produced by a restricted diet should be regarded with suspicion until further and more convincing proofs are forthcoming. Appended is a short reply by Dr. GOLDBERGER who prefers to await the publication of his full report before discussing the subject.

H. M.

* See this *Bulletin* Vol. 7, pp. 51, 52 and 309.

WOOD (Edward Jenner). **Vitamin Solution of the Pellagra Problem. A Preliminary Note.**—*Jl. Amer. Med. Assoc.* 1916. May. 6. Vol. 66. No. 19. pp. 1447-1448.

This paper contains an account of some experiments carried out to throw light on the deficiency theory of pellagra. Similarity in the processes of the milling of rice and corn suggested that a vitamin protective against pellagra might be contained in the outer layers of corn, just as a vitamin protective against beriberi is believed to be contained in the outer layers of rice.

Whereas, formerly, in the Southern States, corn was crushed by water power between stones, milling by steam or electric power is now used. In the present method, the grain is heated to loosen the outer husk, and the germ and husks removed. The ground endosperm forms the milled meal, the husks, germs, etc., being sold for cattle-feeding as "corn chops."

Prisoners fed on this milled meal were described by NIGHTINGALE in 1905 as developing a disease, "zeism," the symptoms of which correspond to those now identified as indicating acute pellagra. The substitution of hand-milled corn completely removed the trouble.

Pigeons fed with milled meal developed polyneuritis symptoms (redness of the legs, weakness and loss of feathers); those fed on hand ground meal remained healthy.

In districts where corn is ground by water power at the local mill and the whole meal eaten, pellagra is unknown. Pellagra is only prevalent in corn-eating districts though sporadic cases may occur elsewhere.

H. M.

VEDDER (Edward B.). **Dietary Deficiency as the Etiological Factor in Pellagra.**—*Arch. Intern. Med.* 1916. Aug. Vol. 18. No. 2. pp. 137-172.

A review of the theories as to the etiology of pellagra, with particular reference to the diet deficiency hypothesis. From a consideration of observations published by many different authorities, the author is inclined to favour the ill-balanced diet theory. The question of a possible similarity between pellagra and acknowledged deficiency diseases such as beriberi is discussed and the following conclusions advanced:—

"1. There is a certain similarity between pellagra and other known deficiency diseases, namely, beriberi and scurvy.

"2. Much of the evidence that has been presented as a proof of the infectious nature of pellagra can be reasonably explained in accordance with a deficiency hypothesis.

"3. A deficiency is demonstrable in the diets of most pellagrins. This deficiency appears to me to result from the too exclusive use of wheat flour, in association with cornmeal, salt meats and canned goods, foods that are known to be deficient in vitamins.

"4. Changes in the diet of the people of the South have occurred during the past ten or fifteen years. Since we do not know all the changes that have occurred, and cannot judge accurately the importance of the known changes, it is unscientific to assume that the recent increase in pellagra cannot be due to such changes.

"5. The hypothesis that pellagra is caused by a deficiency is very plausible and must be taken into consideration in subsequent studies of this disease."

H. M.

BOND (H. E.). **The Causation and Treatment of Pellagra.**—*Med. Record.* 1916. May 6. Vol. 89. No. 19. Whole No. 2374. pp. 816-819.

Referring to the cutaneous symptoms of pellagra, the author quotes a number of observations made by different writers to show that an intimate relationship exists between gastro-intestinal lesions and changes in the skin. He suggests that pellagra is due to absorption, from the intestinal tract, of bacterial toxins which act on the sympathetic nervous system in the intestines and on the chromaffin cells and tissue. Owing to the close connection of these structures with the central nervous system the characteristic skin pigmentation with degeneration and neuritis is produced. The condition is intensified by certain actinic rays of the sun, which act as irritants to the exposed skin surfaces. The treatment advocated aims at a thorough disinfection of the gastro-intestinal tract, and for this purpose such drugs as beta-naphthol, calomel and salol are recommended. A well balanced diet must also be employed.

H. M.

van ZANDT (I. L.). **Some Thoughts on Pellagra.**—*Texas State Jl. Med.* 1916. Aug. Vol. 12. No. 4. pp. 175-177.

The purport of this paper is to combat the idea that pellagra is a diet disease. To those inclined to accept the diet deficiency theory the author suggests that explanations of certain seeming inconsistencies should first be obtained. The chief difficulties set out by the author are as follows :-

Why is it that pellagra is limited to the southern part of the United States while there is abundant evidence to show that poverty and poor diet is equally prevalent in the north ?

Why does the disease become less severe in winter ?

Why were there no cases of pellagra for 410 years after the discovery of America, while during the next 13 years there were hundreds of thousands ? Were there no "unbalanced rations" during these 410 years ?

Why has pellagra practically disappeared from France where from 1829 to 1880 it was exceedingly common ?

With regard to GOLDBERGER's experiments [this *Bulletin*, Vol. 7, pp. 51-52] it is pointed out that the modern treatment of tuberculosis consists in the liberal feeding of the patient. Though this method has often a marked effect in curing tuberculosis nobody doubts that the disease is really a bacterial one due to the bacillus tuberculosis, and that the beneficial action of diet is an indirect one. The view is also taken that many people living in districts in which the disease is endemic may have a greater tendency to develop the malady under unfavourable general conditions than others living in pellagra-free districts.

GOLDBERGER's experiments therefore would be of much greater value if the subjects had been taken from a prison in New York or Montreal where pellagra is practically unknown, rather than from the Mississippi Penitentiary where the disease was actually prevailing.

H. M.

BLOSSER (Roy). **The Etiology of Pellagra with Especial Consideration of the Phenomena of Sensitisation to Maize and Sugar-Cane Products.**—*Southern Med. Jl.* 1916. May. Vol. 9. No. 5. pp. 401-404.

The view expressed in this paper is that the etiology of pellagra is closely bound up with certain products of sugar-cane which contain active poisons; when a sufficient quantity of these poisons is consumed pellagra supervenes. Granulated sugar seems to be innocuous in this respect, but sugar-cane syrups of various degrees of purity appear to be exceedingly deleterious. In support of these contentions the author quotes certain experiments on dogs. Dog number 1 was fed for six months on granulated sugar mixed with a variable diet. No harmful effects were produced. Dog number 2 was fed on a similar diet, except that the sugar was substituted by a corresponding amount of sugar-cane syrup, while a third dog was given a "cheap refinery syrup." Dog number 2 did not develop well and was weak and flabby. On autopsy necrotic areas were found in the intestine, while the liver showed a commencing intralobular cirrhosis; the epithelial cells of the kidney tubes were swollen, granular and blurred. Dog number 3 lived only 10 weeks. Soon after the beginning of the experiment, it showed an erythema of the legs and tail, diarrhoea, photophobia and other symptoms. The autopsy revealed a large yellowish grey liver, catarrhal enteritis, duodenal ulcers and nephritis. The comparative modernity of pellagra in America is accounted for by the new methods utilised in sugar refining, whereby large quantities of cheap syrups have been put on the market. It is also claimed that all advanced and chronic cases of pellagra show a certain sensitisation to sugar-cane products, which on ingestion immediately cause a burning sensation of the tongue, oesophagus and stomach accompanied by palpitation and nervousness. A similar sensitisation is seen in the case of maize.

H. M.

AULDE (John). **Pellagra.—A Critical Study.**—*Med. Record.* 1916. July 29. Vol. 90. No. 5. Whole No. 2386. pp. 181-185.

A study of the constitution of certain diets and their effect in producing pellagra leaves no doubt in the author's mind that the essential fact in the production of pellagra and "all chronic diseases" is mineral deficiency in the protein molecule of the body. It appears that the particular diet most liable to set up pellagra is one in which the amount of magnesium present exceeds the calcium content. This gradually results in a calcium depletion in the body cell with a coincident substitution of magnesium. This "calcium depletion is responsible for pellagra."

H. M.

FAIRBANKS (Geo. D.). **Some Views on Oxidase Activity in Pellagra.**—*Texas State Jl. Med.* 1916. Aug. Vol. 12. No. 4. pp. 173-175.

The author's view of pellagra is that the characteristic symptoms are produced as the result of an acidosis. This acidosis is chiefly due to the presence in the body of phosphoric acid and purins set free in the

circulation by the catabolism of nucleic acid; certain amino- and fatty acids also play a part in this condition. The food eaten by those who contract pellagra is largely composed of substances which furnish excess of nucleic acid, purins and amino-acids, while on the other hand, the necessary amounts of neutralising bodies such as sodium and calcium are lacking. In consequence of this deficiency acidosis ensues, which in turn depresses the oxidase activity of the body tissues. Thus an accumulation of toxins is produced which give rise to the characteristic symptoms of pellagra.

H. M.

MODINOS (P.). *Une nouvelle théorie sur l'étiologie de la pellagre et son traitement.*—*Bull. et Mém. Soc. Méd. des Hôpù. de Paris.* 1916. Apr. 3. Ser. 3. Vol. 32. No. 11-12. pp. 440-443.

From clinical observations the author advances a theory as to the etiology of pellagra. He believes that the malady is due to endocrinic insufficiency, which, acting through the sympathetic, gives rise to the manifestations of pellagra.

Skin lesions analagous to those of pellagra are characteristic of certain diseases caused by insufficiency of the internal secretions of the endocrinic glands, e.g., in Raynaud's disease and in acromegaly. The intestinal troubles of pellagra may also be explained by disturbance of the sympathetic system. The mental phenomena are analogous to the psychoses found in Basedow's disease, in Addison's disease and in myxoedema.

In Egypt the author met with three cases of pellagra which he treated by means of suprarenal extract, in two cases with marked success. In the third case, which was very severe, the cutaneous and mental symptoms showed marked improvement, but the diarrhoea persisted and death ensued. An autopsy showed a large liver abscess to which death was due. The suprarenals were much enlarged, violet in colour, and abnormally hard to the touch. The author considers that the results obtained by treatment support the theory advanced.

H. M.

YARBROUGH (John Fletcher). *Pellagra.*—*Southern Med. Jl.* 1916. Apr. Vol. 9. No. 4. pp. 325-327.

A paper dealing with the treatment and causation of pellagra.

The view is taken that "pellagra is simply an auto-intoxication, the result of a carbohydrate diet, in which there is practically no protein. This carbohydrate or alcoholic material, when taken into the stomach, is quickly converted by the normal heat of the body into what the distillers call 'sour mash.' The production of this sour mash three times daily for weeks and months finally so cripples metabolic activity as to allow this fermented material to be taken into the circulation without the necessary chemical change; the victim's metabolic function has been practically destroyed by eating alcohol, and the result is the varied and complex symptoms we call pellagra."

On this basis of the etiology of pellagra, the treatment adopted naturally aims at restriction of carbohydrates and a gradual substitution of protein food. Medicinal treatment, however, is said to be of much value in accelerating a cure, and much stress is laid on the efficacy of dilute nitric acid given in doses of 20 to 30 drops as nearly as possible

on an empty stomach*. Clinical accounts of several severe cases of pellagra are furnished in which most satisfactory results were obtained.

H. M.

SWANSON (Cosby). **The Differential Diagnosis of the Skin Manifestations in Pellagra from other Dermatoses.**—*Southern Med. J.* 1916. Feb. Vol. 9. No. 2. pp. 117-123.

A useful paper giving a detailed account of the skin lesions found in pellagra and their diagnosis from other dermatoses. The chief diseases having skin eruptions resembling pellagra are "acrodynia, erythema solare, erythema caloricum, erythema ab igne, erythema pernio, erythema multiforme, eczema, especially the erythematous form, trade dermatitis, dermatitis venenata, "recurrent summer eruptions," lupus erythematosus, syphilis, xerodermia, erysipeloid, "erysipelas faciei perstans."

In acrodynia the rash differs from pellagra in that it runs a shorter course and rarely ever recurs. The eruption in erythema solare is generally less acutely inflamed and less red than is the case in pellagra; while pellagra becomes darker, this gradually fades and there is less exfoliation of the epidermis and very little pigmentation. The diagnosis of pellagra from all the other diseases mentioned above is carefully considered.

[This paper, though very valuable, does not lend itself to condensation, as it consists of minute directions for differential diagnosis.]

H. M.

RIGHETTI (R.). **I pazzi pellagrosi nel manicomio prov. di Ascoli Piceno durante il sessennio 1909-1914.** [Pellagrins suffering from Insanity in the Asylum in the Department of Ascoli Piceno, during the Period 1909-1914.]—*Riv. Pellagrolog. Ital.* 1916. May. Vol. 16. No. 3. pp. 36-38; July. No. 4. pp. 56-58.

The author was appointed Director of the asylum at Fermo in 1909. The statistics of the patients admitted suffering from pellagra psychoses showed such a great diminution after his appointment that he was driven to investigate the accuracy of the diagnoses of his predecessor.

Of 106 cases classified by his predecessor as pellagrous mania and admitted to the asylum between 1901 and 1910, 23 were still in the asylum and therefore could be submitted to investigation.

He classifies these as follows :—

Diagnosis.	Men.	Women.	Total.
Dementia praecox	6	2	8
Depressive maniacal psychosis	5	5	10
Imbecility	—	1	1
Epileptic dementia	—	1	1
Senile dementia	—	1	1
Doubtful or complex diagnoses	1	1	2
	—	—	—
	12	11	23

* This with dietetic treatment was advised by Dr. W. E. DEEKS in 1913 in a paper on Pellagra in the Canal Zone [see this *Bulletin* Vol. 2. p. 491.]

He adopts the distinction of FINZI between mental disturbances in pellagrins and the specific psychoses of pellagra. Out of the 23 cases, he considers that only 5 are to be considered as probable cases of the specific psychosis of pellagra, 11 as doubtful, whilst 7 are altogether excluded.

The mental condition of 20 pellagrins coming under his observation in 1909-1914 is analysed; only one showed the true pellagra psychosis; the classification of these cases is as follows:—

Diagnosis.	Men.	Women.	Total.
Psychosis of Pellagra	—	1	1
Depressive maniacal psychosis	5	5	10
Dementia praecox	—	3	3
Presenile psychosis (Kraepelin)	—	1	1
Arteriosclerotic psychosis ..	1	—	1
Senile dementia	1	1	2
Arrested development	1	1	2
	7	13	20
	—	—	—

H. M.

SANDY (Wm. C.). **Psychoses associated with Pellagra.**—*Southern Med. Jl.* 1916. June. Vol. 9. No. 6. pp. 495-498.

A description of the clinical types of psychoses associated with pellagra as seen in the State Hospital for the Insane, Columbia, during the last few months. The exact type of psychosis encountered in pellagrins is probably as much dependent on the natural disposition of the patient as on the etiological factor, so that the mental symptoms vary according to the type of individual affected. The "infective exhaustive psychosis" was present in 28 per cent. of cases and appears to represent the most common type of mental disturbance. In 16 per cent. of cases the "straight manic depressive group" was represented, while in 14 per cent. dementia praecox was the mental diagnosis. In several instances, the ordinary symptoms of general paralysis of the insane appeared, while in others the symptoms were those of senile dementia. In a certain number of cases a satisfactory diagnosis of the mental condition was impossible.

H. M.

O'MALLEY (Mary). **The Report of Twelve Cases of Pellagra and its Relation to Mental Disease.**—*Interstate Med. Jl.* 1916. July. Vol. 23. No. 7. pp. 513-528.

A paper containing short concise histories of twelve cases of pellagra occurring in the Guest Hospital for the Insane, Washington, D.C. The mental aspect of pellagra is discussed in the light of the mental disturbances found in the above cases. The author comes to the conclusion that "pellagra may be associated with various psychoses, without having any specific relation to them, or it may be the causative factor in producing a toxic psychosis."

H. M.

LORENZ (W. F.). **Note cliniche di pellagrosi ricevanti diete eccessive.** [Clinical Notes on the Use of Abundant Diet in the Treatment of Pellagrins.]—*Riv. Pellagrolog. Ital.* 1916. July. Vol. 16. No. 4. pp. 50–51.

The effect of an abundant diet consisting of milk, cereals, eggs, fresh meat, vegetables, etc., used in the treatment of 27 cases of pellagra may be summarised as follows: seven died, three showed no change, thirteen improved and four were cured. Of the 13 cases which showed improvement, in six the mental disturbances were cured and in seven they showed improvement. In the seven fatal cases grave complications were present.

The treatment used consisted of rest and abundant diet; in six cases Bismuth sub-nitrate was given and in other cases castor oil and enemas of soapy water were administered. Antiseptic baths were used for stomatitis and the cutaneous lesions washed with magnesium sulphate.

H. M.

RIDLON (J. R.). **Pellagra. The Value of the Dietary Treatment of the Disease.**—*U.S. Public Health Rep.* 1916. July 28. Vol. 31. No. 30. pp. 1979–1999.

An investigation carried out to ascertain the effects of dietetic treatment on pellagra. Fifty-one cases of pellagra were treated dietetically, some of these receiving medical treatment as well, while to others no drugs were administered. As far as could be ascertained, it appeared that the use of drugs had no influence, for the patients on diet alone improved quite as rapidly as those receiving medication. Patients with slight nervous symptoms showed more ready response to treatment than others. When the predominating symptoms were referred to the skin and alimentary tract, improvement was evident in a week or ten days. The general results obtained lead to the conclusion that dietetic treatment is of paramount importance in pellagra, and that success follows the use of a diet in which the animal and leguminous protein is increased and the non-leguminous vegetable component relatively decreased.

H. M.

BOOTH (B. H.). **Observations on Forty-six Consecutive Cases of Pellagra treated with Cacodylate of Sodium.**—*Southern Med. Jl.* 1916. Feb. Vol. 9. No. 2. pp. 124–125.

In the treatment of forty-six consecutive cases of pellagra with cacodylate of sodium the author has had only one death; all the other cases have done well. The author thinks that pellagra is due to some organism, and that the cacodylate of sodium either acts directly on this organism, or else helps to promote nutrition and so indirectly cures the disease.

H. M.

SECCHIERI (Arturo). **La cura della pellagra con le iniezione di citrato trisodico.** [Cure of Pellagra by Injections of Trisodium Citrate.]—*Policlínico*. Sez. Pratica. 1916. Apr. 23. Vol. 23. No. 17. pp. 532-534.

The author supports the theory of ALESSANDRINI and SCALA that pellagra is due to an acid intoxication caused by drinking water containing colloidal silica and from which certain electrolytes are absent. He describes the treatment of four cases in which good results were obtained by injections of tri-sodium citrate; control cases which did not receive these injections showed no similar improvement.

H. M.

COLE (W. F.). **Accidental Discovery of a Possible Cure for Pellagra.**—*Southern Med. J.* 1916. May. Vol. 9. No. 5. pp. 404-406.

The author believes that pellagra is caused by a germ which "is most likely a protozoa" and that the best treatment for the disease is to be found in the administration of calomel, santolin and castor oil. His faith in these remedies is based on the statement of a woman whose three children were suffering from roundworms and pellagra. She gave them vernifuge for the worms and was surprised to find that not only the worms, but also the pellagra, disappeared. This information she communicated to the author of the present paper, who drew the above conclusions from the data furnished.

H. M.

HUNTER (Andrew), GIVENS (Maurice H.) & LEWIS (Robert C.). **Preliminary Observations of Metabolism in Pellagra.**—*Treasury Dept. U.S. Public Health Service. Hygienic Laboratory Bulletin.* 1916. Feb. No. 102. pp. 39-68.

These experiments were carried out on inmates of the pellagra hospital of the U.S. Public Health Service at Spartanburg, S.C. For the most part they follow the lines suggested by various predecessors in the field of metabolism in pellagra, and are mostly confirmatory in character. Each patient received a carefully defined ration, so that the effect of diet could with some certainty be ascertained. Gastric analyses, indican determinations and nitrogen balances form the chief objects of the present investigation.

Gastric Analyses.—The Ewald test breakfast was given and the gastric contents obtained after one hour. Of 29 individuals examined, "15, or 52 per cent., showed an entire absence of free HCl in the gastric contents; in 3 (10 per cent.) the free acidity was decidedly subnormal; while in 11 (38 per cent.) it was up to or beyond what is generally regarded as the normal limit. . . . Available data would make it appear that in about three-fourths of all cases the free acid of the gastric contents may be expected to be subnormal, and in about half entirely absent."

When the acidity of the gastric contents was normal, pepsin was present in reasonable amounts. Only three exceptions to this rule were met in the series. A deficiency or absence of acid on the other hand was nearly always accompanied by a lack of pepsin. Some evidence was obtained that the absence of pepsin did not indicate that the secretory cells had lost the power to form pepsin, but rather that

the enzyme was destroyed as soon as it appeared in the stomach. The presence of trypsin in the gastric contents was observed in a few cases. The condition of gastric anacidity appears to be very resistant to treatment, for in spite of appropriate therapeutic measures no indication whatever of the return of HCl to the secretion was obtained in any case.

Indican Determinations.—Out of 23 cases examined, no less than eight showed a complete or almost complete absence of indican, while in the others a varying amount was found. The indicanuria was greatest among cases with a deficiency of hydrochloric acid in the gastric juice. The authors conclude that "the existence of pellagra is compatible with any degree whatever of indican production, even with none at all, and that indicanuria, undeniably a common feature of the disease, is by no means an essential one," and makes the following generalisations:—

"(1) The pellagrin whose gastric HCl has not suffered diminution will excrete on a vegetable diet either no indican at all, or at most a moderate amount; but if he is on a meat diet his indican output may be excessive.

"(2) The pellagrin with diminished gastric acidity will always show an excessive indican output when his diet is animal; on a vegetable diet indican may be absent, moderate, or high."

Nitrogen Balances.—Investigations bearing on the nitrogen balance were carried out on seven patients. The results are furnished in tabular form.

H. M.

RIDLON (J. R.). *Pellagra. Laboratory Examinations in Connection with the Disease.*—*U.S. Public Health Rep.* 1916. May 19. Vol. 31. No. 20. pp. 1231-1242.

A description of the results obtained in the examination of faeces, blood and urine from pellagrins.

Faeces.—Since several observers have stated that intestinal parasites are of common occurrence in pellagra, the faeces of 95 patients were examined. The material was obtained in as fresh a condition as possible, and in the majority of cases was examined within six hours after passage. A small portion of the faeces was emulsified in a large drop of warm salt solution and examined with an oil-immersion objective; dark field illumination was also employed in some cases. The results are given in the table.

Table.

Total number of patients examined	..	..	95
Total number of patients infected	..	..	56
Patients infected with			
(1) <i>Trichomonas</i>	..	..	41
(2) <i>Endamoeba coli</i>	..	..	22
(3) <i>Lambia intestinalis</i>	..	..	18
(4) <i>Necator americanus</i>	..	..	10
(5) <i>Strongyloides stercoralis</i>	..	..	2

Yeasts, fine motile spirochaetes and motile spirilla with from two to five turns were also observed in certain specimens. None of the above mentioned parasites or other organisms were considered to play any part in the etiology of pellagra.

Blood.—Blood examination in 55 cases showed that complement fixation tests as carried out by NOGUCHI's technique were all negative ; no evidence was found that a positive Wassermann reaction ever occurs in uncomplicated pellagra. In 28 cases, blood counts, haemoglobin estimations and differential leucocyte counts were carried out, but the figures obtained fail to show "any marked variation from normal beyond a mild degree of secondary anaemia. No constant or characteristic change was noted which would be of material help in the diagnosis of this disease."

Urine.—In a hundred cases examined, the average specific gravity of the urine was 1018.3. A slight amount of protein was present in 9 cases ; no sugar reaction was obtained. In 57 urines tested for indican, 96.4 per cent. gave a positive reaction, while only two patients showed a total absence of this substance. The presence of indicanuria in such a large percentage of cases suggests that this symptom may be of value in confirming the diagnosis in difficult cases, provided a sufficient number of tests are made.

H. M.

LORENZ (W. F.). *Il liquido cerebrospinale nella pellagra.* [The Cerebrospinal Fluid in Pellagra.]—*Riv. Pellagrol. Ital.* 1916. July. Vol. 16. No. 4. pp. 51-52.

One hundred and fifty-three samples of cerebrospinal fluid were examined from 106 cases of pellagra. The examination consisted in a cell count, a determination of the globular constituents and the "colloidal gold chloride" test of WASSERMANN (NOGUCHI) and LANGE. In making the cell count, all the nucleated elements were counted as lymphocytes. Of the 106 cases examined, 96 had less than 5 cells per cubic millimetre ; in two cases the number varied from six to nine cells per cmm. Eight cases, in which a lymphocytosis of from 20 to 60 cells per cubic millimetre was observed, were found to be cases of pellagra complicated by syphilis.

The two reactions used to determine the excess of globulin—the butyric acid reaction of NOGUCHI and that of NONNE-APPELT, modified by ROSS-JONES—gave identical results. Seven cases of uncomplicated pellagra gave positive results and 18 gave "weakly positive" reactions. The excess of globulin in the positive cases was less than 1.8 per cent. With the exception of the eight syphilitic cases and of two others, the Wassermann reaction was negative. The colloidal gold chloride test was also negative except in the eight syphilitic cases.

The determination of the pressure of the fluid was considered to be of little value.

The author concludes that lymphocytosis is not present in uncomplicated cases of pellagra, a result in accordance with recent investigations on the nervous system of pellagrins. The absence of lymphocytosis, or of an increase of the nucleated elements in the fluid, indicates the absence of an infection with inflammatory lesions in the structures bathed by the cerebrospinal fluid.

H. M.

KOCH (Mathilde L.) & VOEGTLIN (Carl). i. **Chemical Changes in the Central Nervous System as a Result of Restricted Vegetable Diet.**—*Treasury Dept. U. S. Public Health Service. Hygienic Lab. Bull.* 1916. Feb. No. 103. pp. 5-49. With 12 charts.

ii. **Chemical Changes in the Central Nervous System in Pellagra.**—*Ibid.* pp. 51-129.

The first paper deals with a series of experiments on monkeys and rats. The object of the investigation was to ascertain what changes occurred in the central nervous system of these animals as the result of feeding on a restricted diet composed of different cereals and vegetables. According to Voegtlin, the etiological factor in pellagra is to be found in a vegetable diet characterised by a high carbohydrate and low protein content, and on this hypothesis it was thought that such a diet might induce in the brain and cord of animals changes similar to those found in pellagra. A ponderous mass of figures and rather involved calculations are furnished and the general conclusions arrived at are summed up as follows :—

“Chemical changes in the brain and cord are observed in animals (monkeys and rats) as the result of an exclusive vegetable diet of various composition.

“Histological examination of the central nervous system of these animals reveals extensive degeneration of many nerve tracts in the spinal cord, very similar to those found in pellagra.

“In some of the animals the chemical changes are practically identical with the changes observed in pellagra. These findings therefore yield additional evidence for the theory that pellagra is a dietary disease.”

The second paper deals with a similar laborious investigation into the chemical composition of the brain of five cases of pellagra. The authors claim to have established the following points :—

“Extensive chemical analyses of the central nervous system in five cases of uncomplicated pellagra, as compared with normal controls, revealed the following principal abnormalities :—

“1. A tendency for the water to increase, a loss of lipoids, and a tendency for the proteins slightly to decrease.

“2. A decrease in the cerebrosides, phosphatides, and sulphatides, which is probably due to an increased lipolytic process, associated with the degeneration of the tissue.

“3. A relative increase in the cholesterol content of the cerebellum and spinal cord.

“4. A diminution of the cholesterol in the cerebrum.

“5. The proteins seem to be the least affected of all the constituents. They are present in normal amounts in the cerebrum and cerebellum. In the spinal cord a decided increase is noted in the dry tissue, whereas in the fresh tissue the proteins are decreased.

“6. A considerable increase in extractives, which compensate for the loss of lipoids; the nitrogen containing noncolloidal extractives are especially responsible for this increase in total extractives.

“A tentative explanation dealing with this increase in extractives is advanced. According to this conception, the increase in extractives is due to a loss of the pathological tissue in certain hydrophobic lipoids, as the result of an increased lipolysis. This reduction in lipoids would tend to increase the water content of the tissue, which secondarily would give rise to a retention of substances causing a rise in osmotic pressure.

“7. A loss of neutral sulphur in the cerebrum and spinal cord, and an increase in this constituent in the cerebellum, which may possibly be interpreted as a disturbance of the oxidative power of the colloidal sulphur compounds.

"In a general way the spinal cord exhibits the most striking chemical changes, a fact which is in perfect agreement with histological observations. The chemical changes in pellagra, while similar in many respects, differ from those in other diseases affecting the central nervous system.

"The present investigation brings out the fact that the central nervous system in pellagra is subjected to a series of considerable chemical changes involving principally certain lipoids. The study of these changes from a chemical point of view has led to a new method of characterization of this disease, which may permit to correlate them, as has been shown in the preceding investigation, with the changes experimentally produced in the nervous system of animals."

[Much of the second paper is taken up with minute accounts of well-known methods of analysis. It is to be regretted that the results of what may prove a useful investigation are presented in such an extremely involved manner.]

H. M.

VOEGTLIN (Carl). **Bread as a Food. Changes in its Vitamine Content and Nutritive Value with Reference to the Occurrence of Pellagra.**—*U.S. Public Health Rep.* 1916. Apr. 14. Vol. 31. No. 15. pp. 935-943.

A paper based on the results of certain investigations carried out to ascertain the possible part played by bread in the etiology of pellagra. The results refer particularly to conditions prevailing in the United States (Spartanburg County), and though dealing chiefly with pellagra may be considered of interest from the point of view of general nutrition. Bread may be regarded as the staple article of diet of the majority of people living in more or less poor circumstances; it is therefore important that bread should possess the highest nutritive value, and any decrease in this direction would probably result in a lowering of the public health. From the time of the early settlers in America up to 1880, the wheat flour or corn meal employed for bread making was obtained by the simple process of crushing the whole grain between stones; the resulting flour or meal, therefore, contained practically the whole of the grain. Gradually, however, changes in the method of milling took place, and in 1878 the roller mill system was introduced. By means of this process it was possible to separate the various parts of the kernel—the germ, the bran and the endosperm—and since the latter gave a much whiter, finer flour than was produced by the old process, the germ and bran were largely discarded and used as food for animals. The highly milled products, however, are often deficient in certain essential food substances—the vitamins—which are located in the aleurone layer and probably also in the germ of the intact grain. The absence of these vitamins is probably of great importance in the etiology of pellagra.

The author claims that the vitamine content of a food, though incapable of direct investigation by chemical means, may be arrived at by ascertaining the amount of phosphorus present, since the vitamine and phosphorus contents run parallel. The following table gives the result of an experiment which seems to bear out these claims. The experiment was carried out on fowls fed with different diets; the number of days during which the fowl remained healthy when fed on a special food gave some indication of the vitamine content of that particular food.

	Per cent. of P_2O_5 in dry food.	Number of days required for appearance of poly- neuritis in fowl fed ex- clusively on this food.
Wheat bread made from highly milled flour	0.114	20-32 days.
Whole wheat	1.120	No symptoms developed.
Corn grits (highly milled) ..	0.169	23-50 days.
Corn grits (highly milled) ..	0.210	30 days.
Corn meal (highly milled) ..	0.30	35 days.
Corn meal (old-fashioned rock ground)	0.659	Remained well.
Corn meal (rock ground) ..	0.772	Remained well.
Corn germ	2.816	Remained well.
Corn, whole	0.760	Remained well.

From these results the author suggests that for corn products the minimum P_2O_5 content should not fall below 0.5 per cent., while that for wheat flour should not be lower than 1 per cent. The well-known fact that certain vitamins are easily destroyed by alkali is discussed and experiments are given to prove that the baking-powder (sodium-bicarbonate) now used so largely plays a marked part in the destruction of these labile substances.

H. M.

STILES (C. W.) Diet and Pellagra. Rabbits and Hares as a Possible Dietary Factor in combating the Disease.—*U.S. Public Health Rep.* 1916. Mar. 31. Vol. 31. No. 13. pp. 817-818.

The author recognises that diet is a dominating factor in the etiology, treatment and prevention of pellagra, and points out that to improve the diet and provide the necessary meat and other ingredients in many poor districts is a difficult problem. He recommends the breeding of rabbits and hares, a scheme which it is claimed possesses many advantages, since these animals are not expensive to breed, do not take much space and would furnish a suitable meat supply in a very short time.

H. M.

PANIZZI (G.). Commissione Pellagologica provinciale di Udine. Lavoro svolto dalla Cattedra ambulante di Agricoltura. Sezione di Latisana. Anno 1915. [Provincial Pellagological Commission of Udine. Report of the Work carried out by the Travelling Lecturer in Agriculture. Session at Latisana in 1915.]—*Riv. Pellagolog. Ital.* 1916. Jan. Vol. 16. No. 1. pp. 9-12.

This report gives an account of the preventive measures used to combat pellagra in the districts of Codroipo, Latisana and Palmanova: special attention was paid to agricultural problems in accordance with the programme laid down by the Pellagological Commission of Udine. Seeds of certain varieties of potato, cabbage and beans were distributed to farmers for cultivation with good results; free distribution of seed of especially favourable varieties of maize was also made. The question of the method of drying maize received consideration.

H. M.

MALARIA.

PARROT (Louis). **Les variations annuelles du Paludisme en Algérie et le régime des pluies.**—*Malariologia*. 1916. Apr. 30. Ser. 1. Vol. 9. No. 2. pp. 53–56. With 1 diagram.

The author's statistics support the saying of the old colonists of Western Algeria that a rainy year is a feverish year. To be exact, in Algeria the intensity of malarial fever in any year depends mainly upon the rainfall in spring (February to April). A very wet spring following an equally wet winter is determinative of a particularly grave epidemic. A dry winter preceding a wet spring has some alleviating influence upon the pernicious effect of the latter. These generalizations have a practical connexion with the prevention of malaria in Algeria.

A. Alcock.

PARROT (Louis). **Le paludisme des Caravanes.**—*Malariologia*. 1916. June 30. Ser. 1. Vol. 9. No. 3. pp. 73–79. With 2 figs. & a map.

Every year in the summer months (June–September) the nomads of Southern Algeria migrate with all their belongings to the fertile northern plateaux, where along with every condition necessary for the breeding of Anopheles mosquitoes, there are, in the vicinity of certain European settlements, resident populations having a high malarial (splenic) index. Consequently the nomads get infected. In the summer of 1915 malaria was extremely prevalent among them; the author, taking haphazard twelve caravans, numbering 245 souls, which had camped in seven different plateaux, records 159 cases, of which 15 were fatal.

He recommends sanitary regulation of camping-grounds and watering places for the suppression of Anopheles, and immunisation, both of the nomads and of the residents of the plateaux, with quinine.

A. A.

CARTER (H. R.). **Notes from Field Work.**—*Malaria Survey of Impounded Waters.*—*Southern Med. Jl.* 1916. Aug. Vol. 9. No. 8. pp. 708–711.

It is fairly well known for certain parts of the world that different local species of Anopheles have different breeding seasons, and also that some species of Anopheles are more prone to infest dwelling-houses than others.

With regard to the first point, the author of this paper records the results of a survey of a particular pond-area in Alabama where, during the year 1915, periodic observations were made, between May and October, of the larvae of three species locally represented, namely, *A. punctipennis*, *A. quadrimaculatus*, and *A. crucians*. According to these observations larvae of *punctipennis* were always numerous; those of *quadrimaculatus* were not numerous until August–September, and those of *crucians* not until October. It was also noted that *quadrimaculatus* appeared to have a marked predilection for ponds, in preference to marshy places or streams.

With regard to the second point, *punctipennis*, though often enough found in outhouses and under residences, was only very rarely found in occupied houses, whereas *quadrifasciatus* was frequently found in occupied houses as well as in the other situations, the observations having been restricted, it should be noted, to daytime. A. A.

U.S. PUBLIC HEALTH REPORTS. 1916. May 19. Vol. 31. No. 20. pp. 1227-1230.—**The Control of Mosquitoes. Whirligig Beetles (*Dineutes*) as a Possible Factor. With a Note on the Predacious Habits of *Dineutes* ("Whirligig Beetles") toward *Anopheles* Larvae.** By R. C. DERIVAUX.

It is well known that whirligig beetles (*Gyrinidae*), like several other common aquatic beetles, both in their adult and in their larval stages, feed freely upon mosquito larvae under aquarium conditions. Experiments made by the author of this paper showed that in the presence of floating debris larvae of *Anopheles* were safe, the whirligig beetles either failing to detect them or being unable to capture them. A. A.

KING (W. V.). **Experiments on the Development of Malaria Parasites in Three American Species of *Anopheles*.**—*Jl. Experim. Med.* 1916. June 1. Vol. 23. No. 6. pp. 703-716. With 8 plates.

This paper gives in detail the results of precise experiments, conducted in New Orleans in the months of November, December, and January, 1915-16, establishing the malarial susceptibility of *Anopheles punctipennis* and *crucians*, and comparing it with that of *Anopheles quadrifasciatus*. The susceptibility of *quadrifasciatus* was proved experimentally by THAYER in 1900, and has been repeatedly confirmed; that of *punctipennis* was, until recently, disputed, and that of *crucians* is now for the first time actually demonstrated.

The results of the examination of individual mosquitoes after feeding on infected blood in these experiments are thus summarised:—

- A. *punctipennis*, with *Plasmodium falciparum* 33 per cent., with *P. vivax* 85 per cent.
- A. *crucians*, with *Plasmodium falciparum* 75 per cent., with *P. vivax*, no test made.
- A. *quadrifasciatus*, with *Plasmodium falciparum* 23 per cent., with *P. vivax* 85 per cent.

A. A.

MARZINOWSKY (E. J.). **De différentes espèces du parasite de la Malaria.** *Ann. Inst. Pasteur.* 1916. May. Vol. 30. No. 5. pp. 243-248. With 3 plates.

From prolonged observation the author supports the opinion that there are more than three malarial parasites of man, and by the name of *Plasmodium caucasicum* he describes and figures a new haemamoeba which he considers to be approximate to *P. falciparum*. It was observed in the blood of an inhabitant of the Black Sea littoral, who, after suffering during the summer from benign tertian, passed into a continued quotidian fever in the autumn. It is to be noted that the blood was not examined until the autumn, after the patient had been treated with quinine.

In this supposed new parasite the young forms are said to be smaller than those of *P. falciparum*, the chromatin more abundant, the vacuole smaller, and the nucleus more salient; the melanin is concentrated in a single peripheral mass, and the number of merozoites resulting from fission is 8 to 10; the individual merozoites are triangular, with an elongate nucleus obviously formed by fusion of two chromidia; in the figures the red blood-cells are only very slightly enlarged, but it is stated that they are rapidly destroyed, and often show both Schüffner's granules and Maurer's dots; the period is 48 hours; gametocytes were not observed, but the author refers to an uninterpreted figure (microphotograph) which seems to fill a red blood-cell completely and to have a large central vacuole surrounded by a broadish ring of small pigment-granules.

The author also refers to another supposed new parasite, also from a malignant case in Transcaucasia, believed to approximate to STEPHENS' *P. tenue*. But for the co-existence of ring forms this parasite might, in the author's opinion, rather have suggested a piroplasma than a haemamoeba.

A. A.

BRUG (S. L.). **Die schwarzen Sporen ("Black Spores") bei der Malaria-infektion im Mückenkörper**, [Black Spores in the Malaria Infection of Mosquitoes.]—*Arch. f. Protistenk.* 1916. pp. 182-197. With 6 figs.

Working with *Culex pipiens* infected with bird-malaria the author encountered numerous instances of prolific crops of black spores. From a careful examination of the physical, chemical, and structural characters of these bodies he considers it in the highest degree probable that they are chitinous, and he proposes therefore that they should be called chitin-corpuscles.

He surmises that chitin formation is excited by a rupture or cracking of the wall of the sporocyst, and that the particular form and appearance of a "chitin-corpuscle" depend upon the time when this chitination was provoked.

A. A.

BARLOW (Nathan). i. **The Results of Intravenous Mercuric Chloride in 100 Cases of Malaria, and the Possibility of its Value in a General Antimalarial Campaign.**—*Amer. Jl. Trop. Dis. & Prevent. Med.* 1916. Apr. Vol. 3. No. 10. pp. 545-563.

ii. **One Hundred Cases of Malaria treated by Intravenous Mercuric Chloride, and the Possibility of its Use in a General Anti-Malarial Campaign.**—*Ibid.* May. No. 11. pp. 581-601.

i. The specific utility of HgCl_2 , as an intravenous injection, in antimalarial operations is to be considered in a continuation of this paper; the present instalment deals mainly with some general principles of malarial prevention and some details of the therapeutic treatment of chronic malaria.

While allowing the sufficiency of antimosquito measures in settled and compact communities, and always advocating their rational employment, the author considers that the alternative policy of eliminating malarial infection from human carriers is easier, cheaper, and of quite unlimited application.

In the attempt to exhaust the human funds of malarial infection what the author has in mind is not a mere indiscriminate issue of prophylactic doses of quinine for establishing individual immunity, but an organized system of preventive measures by localities, measures in which the entire population of a locality participates, while immigration is supervised, the aim being to keep the blood of every individual or, at any rate, of the great majority, free from malarial parasites so that no infection of mosquitoes can occur in that locality.

Such a prophylactic policy implies the maintenance in any given area of a local malarial survey, and such a survey demands an adequate staff to carry out all necessary routine with reasonable despatch, periodical or seasonal examinations of the blood of the population (and in some individuals of other physical conditions also), the upkeep of individual records on the card system, and particular attention to chronic and relapsing cases and to the treatment of patients who resist or reject quinine. It also postulates in the staff, as the author does not fail to realize, certain moral attributes and diplomatic gifts that are generally understood to come rather by heritage than by taking thought.

For the rest, the author, in this introduction to the study of the value of mercury in the treatment of malaria, discusses to some extent the uses, action, and limitations of quinine, and emits some interesting physical and biological speculations to account for the resistance of the parasite in chronic and relapsing cases of malarial fever.

ii. The first fifty cases were treated with HgCl_2 alone, the second fifty with HgCl_2 in combination with quinine.

The dose injected was one-eighth of a grain of HgCl_2 in 10 cc. of normal saline solution.

The effect on the parasites, both schizonts and accessible gametes, is said to be directly destructive, but the immediate amount of destruction is limited, not complete, comprehensive, and overwhelming, and the author concludes that although if the number of parasites be small and there be no enlargement of the spleen HgCl_2 alone will frequently sterilize the blood of malaria, yet this limitation renders HgCl_2 by itself an uncertain remedy.

One of the most striking effects of HgCl_2 in combination with quinine is the very rapid reduction of an enlarged spleen, justifying the hope that this combination may establish a complete cure more quickly than quinine alone.

No ill effects worthy of mention followed the intravenous injection of HgCl_2 . In three or four cases there was some local phlebitis, possibly due to the needle not completely penetrating all the coats of the vein. In one case there was salivation, and in another case albuminuria, in both cases transient. The slight and transient diarrhoea that occurred in eleven cases can hardly be considered an evil effect, the author thinks.

A. A.

DENNYS (Geo. W. P.). **Iron and Arsenic as a Cure for and a Prophylactic against Malaria.**—*Indian Med. Gaz.* 1916. July. Vol. 51. No. 7. pp. 242–246.

An interesting paper, giving the author's experience of arsenic in the treatment of malarial fever, and strongly advocating the use of that drug in gradually increasing doses.

Early in his service the author's faith in the all-sufficiency of quinine (bisulphate) was shaken by its failure, though taken in enormous doses, to rid him individually of long-persistent attacks of malaria, and his confidence in arsenic was engaged subsequently by the cure which it effected in his own case.

For many years now he has employed arsenic, in combination with quinine and iron, for the treatment of chronic malaria (even in cases complicated by pregnancy) and of long-standing enlargement and induration of the spleen, and he gives abstracts of cases where this combination was successful after all methods of treatment by quinine alone had actually failed.

The formula recommended is Arsenious acid gr. 1/60, Ferri et Ammon. Cit. gr. 3, Quin. Sulph. gr. 1, in a tabloid; and beginning with one such tabloid daily after a meal, he gradually proceeds to four daily, continued if necessary for three or four months. In a few very persistent cases the number of tabloids has been increased to five or six daily. If there are symptoms of intolerance the dose is mitigated temporarily.

The author is convinced also of the efficacy of this combination, or even of arsenic and iron alone, as a preventative.

Although the author appears to regard the quinine as a spell rather than a potent ingredient of the tabloid, and although in one of his prophylactic experiments arsenic and iron (sulphate) alone were used, the fact remains that the treatment which he has found to be so successful in chronic malaria is a combination of arsenic and quinine.

A. A.

DUNLEY-OWEN (A.). **A Note on Administration of Quinine.**—*S. African. Med. Rec.* 1916. July 8. Vol. 14. No. 13. pp. 196–197.

The author has obtained the best results in acute cases by giving bihydrochloride of quinine in ten-grain doses (combined with ten minims of tincture of orange) every four hours until the body-temperature has been normal for three days, then three times daily for a week, and after that in a five-grain tabloid every night for a month. Before the first dose of quinine ten grains of aceto-salicylic acid is useful to relieve headache and to promote diaphoresis. For children a rectal injection of 5 grains, followed by hourly injections of $2\frac{1}{2}$ grains, may be given with safety.

A. A.

SERGI (Antonio). **La campagna antimalarica interepidémica.** [An Anti-Malarial Campaign in the Winter.]—*Malariologia.* 1916. Apr. 30. Ser. 1. Vol. 9. No. 2. pp. 64–69.

An article urging the importance of treating chronic cases of malaria throughout the winter at the public expense, so that these cases may not serve as foci of infection in the subsequent mosquito season. It is suggested that the cost of such treatment might appropriately be borne by the local authorities, instead of by the Central Government.

J. B. Nias.

SERGEANT (Etienne). **Assainissement antipaludique et amélioration agricole simultanés et rapides d'une région infectée par un ancien lit de rivière (Oued Djer, Algérie).**—*Bull. Soc. Path. Exot.* 1916. July. Vol. 9. No. 7. pp. 504–509. With 1 plate & 3 figs.

An interesting account of the steps by which a marshy fever-stricken ravine in Algeria was reclaimed to healthful and profitable husbandry in the course of a few years.

The marsh was formed in the lower abandoned gorge of a river whose upper course had been artificially diverted, and was a nursery of *Anopheles* larvae. For its reclamation a syndicate of riverain proprietors supplied the labour, and the Government provided the skilled advice and supervision as well as the necessary subsidies. The steep sides of the ravine were cut away and sloped so as to fill in all the marshy bottom, except a narrow drainage channel down the middle. The bottom was then planted with willows, and the slopes with ash, robinia, acacia, ebony, and deciduous cypress. The expense came to 31,000 francs and the tract recovered amounted to between 4,000 and 5,000 acres.

In the following spring a few pools remained, but they quickly dried up.

Concurrently with these operations quinisation of the native population was carried on, and was continued as immigration into the reclaimed country proceeded.

Even in the first year after completion of the work there was a remarkable decrease both in *Anopheles* and in fevers. In succeeding years cultivation of the vine and the orange was introduced, lucerne was grown, and the slopes were planted with tobacco. Eventually the reclaimed area became so salubrious that it was free from fever in a year when prolonged spring rains followed by an excessively hot summer furnished optimum conditions for an outbreak of malaria.

A. A.

FOY (George). **The Spelling of Cinchona.** [Correspondence.]—*Lancet.* 1916. Aug. 19. p. 350.

In the *Lancet* of 12th August 1916 a correspondent resuscitated Sir Clement MARKHAM's appeal that the spelling of the name Cinchona should be altered to correspond literatim with the name of the supposed European sponsor of the bark—the famous Countess of Chinchon. To that the letter at present under reference is an answer, and the writer after pointing out that the sponsorial connexion claimed for the Chinchon family is very considerably a matter of surmise, whereas the vernacular name of the bark, Kina-Kina, seems to have been accepted as an audible fact, concurs in the judgment of the editors of the great English Dictionary that the established form, Cinchona, is so firmly fixed that any change would be inexpedient.

A. A.

BLACKWATER FEVER.

STEPHENS (J. W. W.). **Studies in Blackwater Fever. V. The Duration of Haemoglobinuria.**—*Ann. Trop. Med. & Parasit.* 1915. Dec. 30. Vol. 9. No. 4. pp. 539–542. With 1 chart.

An epitome and tabulated conspectus of 167 cases, showing the duration of the symptom to have been twenty-four hours or less in 80 cases, 1–2 days in 42 cases, 2–3 days in 30 cases, 3–4 days in 7 cases, 4–5 days in 5 cases, and in the 3 remaining cases 5–6 days, 7 days and 8 days respectively. The author offers these observations merely as data to be considered along with other specified factors, in a general synthesis of the pathological phenomena.

A. Alcock.

OTIS (Elmer F.). **A Few Cases of Blackwater Fever and of a Peculiar Entero-Colitis.**—*Amer. Jl. Trop. Dis. & Prevent. Med.* 1915. Dec. Vol. 3. No. 6. pp. 327–331.

This brief miscellany from Santo Domingo consists of remarks upon several cases of blackwater fever and a resumé of one of them, and a synopsis of a case which is diagnosed as “toxic entero-colitis.” The chief symptoms of this case were a temperature fluctuating downwards to 97° F. from an initial rise of 103·6° F., depression amounting at the outset to collapse, and persistent and obstinate constipation; there was no pain except occasional headache, no abnormality of urine, and no enlargement of the spleen, and nothing is said about the condition of the blood, yet the author considers that it “has all the earmarks of malignant malaria,” and alludes to a contingent relation to blackwater fever.

A. A.

UNDULANT FEVER.

SERGEANT (Edm.), NÈGRE (L.) & BORIES (L.). **Epidémie de fièvre ondulante à Arzew et Saint-Leu (Dép. d'Oran, Algérie) en 1915.**
Bull. Soc. Path. Exot. 1916. June. Vol. 9. No. 6. pp. 351-356.
 With 4 charts.

In parts of Algeria undulant fever has practically been stamped out, but in the department of Oran and in particular at Arzew active foci of the infection still exist. In 1915 an outbreak of the disease occurred at Arzew and Saint-Leu which presented some very interesting features. It lasted from February to May and affected 20 people, 13 military and 7 civilians. The first cases were noted from Saint-Leu and the greater number at Arzew were in the military who had been stationed at Saint-Leu two or three months before being admitted into hospital. The seriousness of the disease in the mortality and loss of efficiency for service is shown in the following table :—

Duration of Illness.

1-2 Months.	2-3 Months.	3-4 Months.	4-5 Months.	5-6 Months.	6-7 Months.
4	4	4	1	3	1
(2 deaths) (1 death).					

The temperature charts show the prolonged irregular character of the fever. Clinically three cases were without any well marked characters; one was of a typhoid type, one patient had orchitis which lasted three months, one had double sciatica lasting three months, and seven showed marked nervous depression with articular pains. Unusual complications noted were, ulcers of the stomach causing death from haemorrhage, broncho-pneumonia, pulmonary congestion with myocarditis causing death in the fifteenth week, meningitis with death at end of a febrile paroxysm.

In 1907 in this area 3·3 per cent. of the goats were found to be affected, as well as horses, asses and dogs; in 1912 horses, mules, and asses gave agglutinating serum when tested by SÉJOURNANT. The infection was therefore enzootic. It is probable that owing to fatigue the military were specially susceptible and the organism found a favourable soil in them; hence the severity of the epidemic. The germ was conveyed by the use of unboiled milk or fresh goat cheese, though in nine cases this was not proved; the goats were undoubtedly the cause, directly or indirectly, of the epidemic. These were nearly all imported from Spain, originally being infected by the Maltese goats from Gibraltar. To stop the spread of the infection it was therefore necessary to interdict entirely the importation of these goats from Spain, or at least to submit them to a rigorous bacteriological examination.

P. W. Bassett-Smith.

NICOLLE (Ch.) & GOBERT (E.). i. **Seconde enquête sur les chèvres laitières de Tunis au sujet de la fièvre méditerranéenne.**—*Bull. Soc. Path. Exot.* 1916. Feb. Vol. 9. No. 2. pp. 86-95.

ii. **Recherches sur la fièvre méditerranéenne poursuivies à l'Institut Pasteur de Tunis. Troisième Mémoire.**—*Nouvelle enquête sur les chèvres laitières de Tunis.* *Arch. Inst. Pasteur de Tunis.* 1916. Apr. 1. Vol. 9. No. 3. pp. 157-175. With 1 map.

i. In 1909 it was proved that in Tunis the goats imported from Malta were those most infected and that the thorough measures taken by the government to prevent the importation of any fresh infected animals had given the most satisfactory results. In two years the number of positive infections in man had fallen from 63 to 23 and in 1914 these had decreased to 7, but in 1915 the number had again risen to nearly its old level; therefore a fresh enquiry was made into the number of infected goats. From July to December, 2,354 goats and 36 other animals were tested; of the goats 1,277 were of the Maltese breed and 1,077 were Arabian or crossed breeds. The Maltese were mostly found in the towns, the milch goats in Tunis numbering about 5,000. These were divided into 79 herds, numbering from 10 to 116 in each. It was found that the hygienic conditions of some of these were bad, the stables of the Maltese being the worst, the goat-herds generally living in close proximity with the beasts. For the tests, serum reactions were used and the test emulsion was made with a strain of *M. melitensis* isolated from a goat in 1909, in 7 per cent. of fluorite of sodium, eight million microbes per cmm. This fluorite emulsion has been found to be much more satisfactory than saline emulsions for both the human and animal tests.

A dilution of less than 1/20 was never used but 1/80 was found always to give definite results. The enquiry showed that in the Maltese goats the frequency of infection was infinitely greater than in the Arabian (11 times more often) and that those stables containing the greatest percentage of Maltese goats showed the highest number of infections; certain of these were particularly marked centres of infection.

It is probable that by passage the *M. melitensis* in Tunis has acquired an increased virulence to the indigenous goats and that the infection is spread from goat to goat by contagion; the infection of other animals appears to be negligible. The practical conclusions are that the same rigorous measures must be continued to prevent introduction of fresh infected goats but it is also necessary to stop the local infections from spreading by instituting a thorough service of inspection bi-annually of all the milch goats without exception, as well as the men and other animals inhabiting the stables. Goats in which the serum shows the agglutinating power higher than 1/80, confirmed by a second examination, should be killed, the proprietor being indemnified. Goats that react to 1/40 but not to 1/80 should also be examined a second time and if the titre has risen above 1/80 the animal should be killed. Distinctive discs should be fixed on to the examined animals and made obligatory. Hygienic measures must be carried out for the stables. Prophylactic inoculation for goats might be used but further work is required on the value of this measure. The importance of boiling all milk should be insisted on for the general population, and notification of cases of the disease in man made compulsory. If these measures are carried out

the number of infected goats will rapidly diminish and the health of the people will be safeguarded.

ii. In this third report the authors restate more fully what they have already brought forward in their second [reviewed above]. The value of the paper is greatly increased in that it gives copies of the ordinances promulgated by the Government of Tunis and introduces a plan of the town of Tunis and the exact localities in which cases of undulant fever were notified. The information and recommendations are however so slightly altered that it is unnecessary again to refer to them in detail, except to emphasise the fact that in 1915 there was a marked increase in the cases of melitensis infection in Tunis both among the human and goat population. It is therefore absolutely necessary to insist upon all the prophylactic measures recommended being rigorously carried out to prevent fresh importation of infected animals, and to stop the disease, which is at present in some of the herds, from being passed from infected to healthy goats.

The report should be carefully studied by all Public Health Officers who are employed in the endemic areas of the disease.

P. W. B.S.

IZAR (Guido). Studi sull' infezione spontanea da micrococco di Bruce negli animali domestici.—Sperimentale. 1916. June 9. Vol. 70. No. 2. pp. 137-158. With 5 tables & 1 fig.

In this long and careful study the author has brought together the results of many workers relating to the infection of the various domestic animals, but much is of purely historical interest. The diminution of the number of infected animals in Malta is pointed out as well as the increase of the diffusion of the disease in other countries. For detection of the animals so infected the serum and lacto-reactions are most important but, as was shown by HORROCKS, KENNEDY and CRAWFORD, in a series of animals examined by both methods the lacto-reaction gave an error of 28 per cent. The author describes the technique used by ZAMMIT, PULVIRENTI, PISANI, CANTIERI, and VIRGLIO, and of these he prefers that of PULVIRENTI. He points out, as others have done, the importance of using well accredited strains for the test and also of the recognition of the errors caused by paradoxal reactions. There is a long list of the animals which have been examined and the different percentages of positive results obtained by various observers, with tables of the observations made. These are summed up. Of 1,289 lactiferous animals examined, 1,253 were goats and 36 were cows; 11·8 per cent. of the goats and 2·7 of the cows gave positive milk reactions. He gives a figure showing how infections tend to be grouped together in certain areas, the disease being spread directly from one individual to another and from one group to another. Finally he gives a table of animals which might convey the disease from one country to another, examined by the serum test during a period of twelve months:—

	No. of animals.	Positive serum reactions.	Percentage of infected animals.
Dogs ..	268	2	0·7
Cattle ..	825	1	0·12
Goats ..	35	3	8·5

P. W. B.S.

LAPENNOTTE (X.) & DELANOË (M. et Mme. P.). **Au sujet de la Fièvre ondulante à Mazagan.**—*Bull. Soc. Path. Exot.* 1916. Apr. Vol. 9. No. 4. pp. 207–211.

The authors describe the first two cases of undulant fever that have been recorded from Mazagan, Morocco, in two brothers aged 15 and 13. The first was attacked in September 1914 and was ill for four and a half months with the typical syndrome of undulant fever, waves of pyrexia, sweats, constipation, and joint pains. In February he went with his younger brother to France and the latter developed the disease. In both cases definite positive serum reactions for undulant fever were obtained; in dilutions of serum up to 1/400 with *M. melitensis* for the elder brother and up to 1/500 with *M. paramelitensis* for the younger. It is important to note that the disease in the latter case was relatively shorter and less severe than in the true melitensis infection of the elder brother. It is stated that the elder boy did not drink goat's milk before he was taken ill, but the author points out that troops of Maltese goats which had been imported from Spain are frequent in the streets and that milk is sold from house to house, but as no laboratory exists at Mazagan examinations of the milk have not been made. As a possible though improbable origin of the disease the fact is noted that the father of the two boys was a butcher and infection may have been derived from sheep infected with the *M. melitensis*. Similar prophylactic measures as are in force in Tunis and Algeria are urgently required for Morocco. P. W. B-S.

CORTESI (Primo). **Il primo gruppo di casi di febbre di Malta in Romagna.**—*Riv. Crit. Clin. Med.* 1916. Feb. 12. Vol. 17. No. 7. pp. 73–75.

The author describes four cases from Coccchia in the Commune of Ravenna. In all these the diagnosis was confirmed by serum reactions and blood examinations isolating the specific micro-organisms. Two of the cases were in the same family and the others lived near to them; three were milk sellers. The cause of the infection, whether from the milk of the cows or from faecal or urinary infection, was not proved, further experimental researches being required. P. W. B-S.

MAXWELL (J. Preston). **Undulant and Paratyphoid Fevers in Fukien Province.**—*China. Med. Jl.* 1916. Mar. Vol. 30. No. 2. pp. 100–103.

These diseases have up to the present been rarely recorded from China. The author reports a typical case of undulant fever; the patient was his own cook, so that the symptoms were carefully observed, and a positive serum reaction was obtained, but no etiological data are given. Three other probable cases had been seen by the author but had not been definitely proved. Typhoid is not uncommon in the districts. Some abnormal forms of fever led to further examinations and two cases are recorded in which the serum reactions were positive for paratyphoid B, negative for paratyphoid A, and typhoid. The first case was complicated with amoebic dysentery and ended fatally but no post-mortem was made. The second was admitted for malaria, malignant ring parasites being present in the blood; these disappeared under quinine treatment but the fever persisted. P. W. B-S.

LUNGHETTI (Bernardino). **Contributo allo studio anatomo-patologico della febbre melitense.**—*Riforma Med.* 1916. July 26. Vol. 32. No. 26. pp. 697-705.

The great variability of the clinical pictures of undulant fever and the low mortality of the disease have induced the author to describe in detail the anatomical pathological changes found in a case of his own in which very full records were kept, the autopsy being made 30 hours after death. In this examination the chief characters noted were congestion of the meninges, slight myocarditis, oedema of the lungs, marked intestinal catarrh with increase of lymphoid tissue, enlarged mesenteric glands, large liver (1,550 grams), large dark spleen (200 grams). The *M. melitensis* was isolated, *B. coli com.* and *B. faecalis alkaligenes* were found in the intestinal tract. The microscopical pathological results were those of a general congestion of the organs and viscera from the toxic action of a septicæmic condition caused by the *M. melitensis*.

There is a very complete short review of previous reports that have been published by different workers, who are named in each instance. These show how widely the micrococcus and its toxins affect the organs and tissues, but that it produces no definite diagnostic lesions. It affects profoundly the red blood cells and decreases the phagocytic activities of the white cells, but it is evident that the toxicity of different strains of the organism varies very much; this explains to a certain extent the contrary reports of many observers. The changes depend also largely upon the stage of the disease in which death occurred. The author draws attention to the importance of further experimental study of the infection in animals.

P. W. B-S.

CASTRONOVO (A.). **Su di un caso di febbre del Mediterraneo con emorragie della cute e della mucosa.**—*Malaria e Malat. d. Paesi Caldi.* 1916. Jan. Vol. 7. No. 1. pp. 20-22.

The author describes fairly fully a case of undulant fever in which there was marked hæmorrhage both of skin and mucous membranes; as this is a rare complication it is important to recognise its occasional occurrence. The subject was an adult male, aged 20, whose family was proved to be free from any hæmorrhagic diathesis. The first wave of the fever lasted 20 days; on the 25th day the symptoms and fever returned, and were associated with profuse epistaxis and hæmorrhage from the gums; there was also some hæmaturia and bleeding into the bowel. Petechiæ appeared on the skin of the arms and chest but none on the abdomen or legs. At this time the patient was removed to hospital and vigorous measures had to be taken to stop the hæmorrhage from mouth and nose. There was little disturbance of the nervous system but the pyrexia was continued and the spleen was enlarged. Convalescence was slow. A serum examination for diagnosis gave negative reactions for typhoid and paratyphoid but positive agglutinations with the *M. melitensis* in dilutions from 1/50 to 1/2000. The case at one time was thought to be typhus but the diagnosis from typhoid was more difficult; this was however cleared up by the high agglutination reactions.

[The reviewer has noted haematuria in cases of undulant fever during late pyrexia periods, which came on without any definite cause. A haemolytic action has been attributed to the toxin of the specific organism. In South Africa haemorrhagic cases have also been reported (this *Bulletin*, Vol. 1, p. 78)].

P. W. B-S.

IZAR (Guido). *Mutazioni morfologiche culturali e biologiche in Vitro ed in vivo del micrococco di Bruce per azioni dei sali di chinino. Nota Preventiva.* [The Morphological, Cultural and Biological Mutations of Bruce's Microbe as acted upon by Salts of Quinine *in vivo* and *in vitro*.]—*Pathologica*. 1916. June. Vol. 8. No. 182. pp. 175–176.

The author made an elaborate study of the action of the salts of quinine upon the *M. melitensis*. He found the strains he was working with were very sensitive to these and by repeated cultures they are found to grow luxuriantly in strengths which were at first bactericidal, but morphological changes take place, chiefly bacillary and streptobacillary forms, with increase in size. With cultivation the growth is more dense and white, and biologically there is a loss of specific agglutinability and an increase of non-specific agglutinability. These changes were observed in an organism obtained from a case of low fever having the characters of undulant fever. The continued administration of salts of quinine to cases of undulant fever, from whose blood the *M. melitensis* had been isolated and whose serum gave definite agglutination reactions, rendered the serum very agglutinable to a strain grown in broth cultures augmented with salts of quinine, as well as to the organism isolated from the blood. He also found that serum of undulant fever cases which had been treated with salts of quinine had marked specific agglutination reactions with the *M. paramelitensis*, whilst an immune serum for the *M. paramelitensis* gave good agglutination reactions to the two strains of *M. melitensis* grown in the quinine treated broth and to the strains obtained from the blood of patients treated with quinine. Finally he states that the effect of quinine on the strains of *M. melitensis* in both man and animals is to give them the morphological, cultural and biological properties of *M. paramelitensis* of NICOLLE.

P. W. B-S.

YAWS.

RICONO (M.). **Yaws and Similar Diseases in South Africa.**—*S. African Med. Rec.* 1916. Mar. 25. Vol. 14. No. 6. pp. 83–89. With 6 plates.

The author gives details of eight cases of yaws in men and women (all but one natives), which occurred in the Mount Fletcher district, South Africa, during 1914–15. The cases were watched from the first examination to practical recovery. The parts most frequently affected were the genitals, scalp, mouth and nose orifices, face, axillae and extremities. It is worthy of note that Mount Fletcher is 5,500 feet high, and so is mountainous and cold, and yaws does not usually occur in such situations. The differential diagnosis from syphilis is given.

Salvarsan and neosalvarsan were found in yaws to be “ideal remedies.” As a rule, a single muscular injection in moderate dose (0.4 gm.) is sufficient. The patient is cured in about ten days.

Six cases of granuloma inguinale are mentioned, and two of them are described in detail. Salvarsan had a slow curative effect.

Pyosis caffra is also described. It is a contagious skin disease, very common in native territories. It is probably of streptococcic origin, chiefly affects children, and is more prevalent during the hot damp season. Crusty lesions, especially of the extremities and buttocks, occur in children. The treatment is tar, sulphur or salicylic ointment after a good cleansing of the affected parts. Potassium iodide is beneficial.

The paper is illustrated by 26 photographs.

A. Porter.

KNOBEL (J. B.). **Yaws in the Military Hospital at Keetmanshoop.** S. W. A.—*S. African Med. Rec.* 1916. May 27. Vol. 14. No. 10. pp. 151–153. With 1 fig.

An account is given of a family of five Klip Kaffirs, sent to the native hospital at Keetmanshoop, supposed to be suffering from syphilis. Yaws was found to be the real malady. The father had a rash which “more resembled combined successive crops of vaccination pox from the fourth to the twelfth day old.” They contained no lymph, were not particularly sensitive to scratching, and the older ones were crusted over with “yellowish dry cheesy matter, fluffy in the centre.” The face and head bore a closely crowded mass of nodules, but the lips and skin around were clean. A few nodules were scattered on the trunk, the scrotum and perineum. The head and neck were most affected. The appearance of the three children was different from that of the father. The mother was not affected. Treatment with arsenic pills was used and the man had injections of salvarsan. Three other cases of Hottentots are also described. The cases all responded to treatment with arsenic in hospital.

A. P.

CASONI (Tommaso). *La framboesia tropicale a Tripoli. Su alcune particolarità cliniche e terapeutiche.*—*Malaria e Malat. d. Paesi Caldi*. 1915. Sept.-Dec. Vol. 6. No. 5-6. pp. 223-236. With 5 figs.

During the course of his large experience from August 1912 to September 1915, the author has encountered only eleven cases of yaws in Tripoli. Two of the patients were Jews and the remaining nine were Arabs. The eleven cases are described in some detail and some of them are pictured. The symptoms and the distribution of the eruption were much like those given in general text-books of tropical medicine, but a few features were slightly different. Headache, high fever, gastric disturbance, diarrhoea and rheumatoid pains were absent from the primary stage. The early form of eruption persisted throughout the disease, and the initial lesion was still visible when the secondary stage ensued. Tertiary forms of yaws have been seen. *Spirochaeta pallidula*, that is, *Treponema pertenue* was demonstrated in four cases only.

The treatment consisted in the administration of salvarsan intravenously in doses of 50 centigrams for adults, while for youths 40 cg. was used. In two cases only was a second injection needed to effect a cure.

A. P.

Van den BRANDEN. *Le sel sodique du Salvarsan cuprique dans le traitement de la Trypanose humaine, du Pian et de la Syphilis.*—*Bull. Soc. Path. Exot.* 1915. Oct. Vol. 8. No. 8. pp. 582-586.

Cupric salvarsan was tried by the author in Belgian Congo in 12 cases of yaws and six cases of syphilis. Intravenous inoculation was used for adults, but for children injection into the muscles of the buttocks, this producing induration at the seat of inoculation. Distilled water containing 5 per cent. solution of ordinary sugar was used in varying quantities as a solvent for the salt. The lesions of both yaws and syphilis rapidly disappeared under treatment. In yaws the cure was definitive, while in syphilis certain relapses occurred after short treatment.

Tables are given of 12 cases of yaws, of which 10 were cured, the remaining two not coming again for examination. Of the six syphilitics, five were cured and one showed great improvement.

The sodium salt of cupric salvarsan has treponemicidal properties like those of salvarsan and neosalvarsan.

A. P.

BERGEN (L. G.). *Ueber das Ergebnis der Behandlung der Framboesia tropica (Yaws) mit Salvarsan und Neosalvarsan im Lazarett in Paramaribo.*—*Arch. f. Schiffs- u. Trop.-Hyg.* 1915. Sept. Vol. 19. No. 18. pp. 481-490. With 4 figs. & 9 curves.

The author has treated many cases of yaws with salvarsan and neosalvarsan in the hospital at Paramaribo, Dutch Guiana. Adult

patients usually received intravenous injections, and children intramuscular ones. Sometimes a painful swelling appeared at the site of inoculation, but the pain diminished after a few days.

The doses of salvarsan used were :—

For adults	..	..	..	..	600 mg.
Aged 18-20 years	..	..	..	..	500
16-17	..	..	..	..	400
10-15	..	..	..	..	300
7-10	..	..	..	..	200
5-7	..	..	..	..	150
3-5	..	..	..	..	100
Infants to 2 years	..	..	..	..	50

The dose of neosalvarsan was one and half times that of salvarsan.

Treatment intramuscularly took somewhat longer to effect a cure. The time required for healing, based on 1,786 patients, was as follows :— If treated intravenously, the average time for healing was 11 days, the shortest time was two days. If intramuscular inoculation was practised, the average time was 13 days, the shortest time two days. With salvarsan, the average time for apparent cure after intravenous injection was 9 days, after intramuscular treatment 12 days. With neosalvarsan, after intravenous inoculation the time was 13 days, while after intramuscular injection the time was 14 days. The longest time for apparent cure was 135 days with salvarsan, 84 days with neosalvarsan. In many cases the papules had dried up the day after injection, while the majority of patients were healed in about 14 days.

The number of relapses varied with the drug and the mode of administration. Out of 1,626 patients treated intravenously with salvarsan, 4.92 per cent. relapsed in a period of 34 months ; of 655 treated intramuscularly, only 2.6 per cent. relapsed in the same time. It is possible that some cases were reinfections and not relapses.

Various races of men were treated. They included natives of Surinam, British India and Java. Sex seemed to have no influence on the incidence of the disease. More men were treated than women, but men preponderated in the colony. The number of yaws cases appeared to be greater in the dry season. Blindness after the use of salvarsan was not observed.

A. P.

RUTHERFORD (C. G.). Report on the Treatment of Parangi (Framboesia or Yaws) in the Government Hospitals of Ceylon, by Salvarsan, Arsenious Iodide and Arseno-benzol. — MS. Report received in Colonial Office November 26, 1915.

The report deals with the treatment used in Ceylon for the disease termed "Parangi," yaws or framboesia, by intramuscular and intravenous injections of salvarsan, arseno-benzol and substitutes that have been tried since the two former drugs became difficult to obtain.

From 1911, when the use of salvarsan for yaws was introduced in Ceylon by CASTELLANI, until 1914, the remedy was used with much success and in extended areas in the island. It was found that old cases with bone lesions were more resistant to the remedy than others not so far advanced. Few cases of relapse occurred.

With a view to finding a substitute for salvarsan and arseno-benzol, Dr. SPITTEL has experimented with satisfactory results, intravenous injections of arsenious and mercuric iodide being employed. "At the commencement of this method of treatment 3 to 5 cc. of a standard solution of arsenious and mercuric iodide was injected intravenously every fifth or seventh day, according to the amount of reaction. Five to seven of such injections constituted a course." Medical officers to whom the solution was supplied, reported favourably on its curative effects, but remarked on its relatively slow action compared with salvarsan. After further work, 8 to 10 cc. of the solution for an adult male with a proportionate reduction for women and children was used, and ultimately a dose of from 10 to 15 cc. Early amelioration of the morbid conditions was noticed. In some cases the patients left hospital before the completion of the course of treatment, but it was noticed that few returned, as would have been the case had there been serious relapses, while other patients from villages to which treated cases had returned came for treatment.

It is desirable that the population should be familiarised with the idea "that (1) Parangi is an infectious disease conveyed from person to person by contact, (2) that it can be prevented, (3) that it can be cured, (4) that the treatment is practically free from danger, and in most cases permanent."

Two tables showing the quantities of the afore-mentioned drugs distributed to Ceylon hospitals from 1913 to 1915 are appended.

A. P.

THOMSON (G. W.). **Report on the Treatment of Yaws in Jamaica, by the Castellani Method.**—MS. Report received in Colonial Office Apr. 20, 1916.

The present report deals with the treatment of 28 cases of yaws at Montego Bay, Jamaica, by CASTELLANI's method [see this *Bulletin*, Vol. 5, p. 422]. Three were treated in hospital and twenty-five as out-patients.

The author summarises his results as follows :—

"(a) Treatment by this method is very successful. There is very little improvement noticeable in the eruption and pains for the first 10 to 14 days. After this improvement is very rapid and there is complete cure of all symptoms in six weeks from the commencement of treatment.

"(b) The combination of drugs in the Castellani method is a very happy one as the drug is well tolerated by the stomach and in no case has digestion been disturbed. Nor has there been any symptom of iodism in any case.

"(c) The treatment while not so effectual for outpatients is yet far in advance of the old treatment for yaws for these patients, but it is better

suited for hospital cases as one is then certain that the drug is being taken and as a matter of fact outpatients do not improve so rapidly as inpatients.

"(d) The method followed was to give full doses three times a day for 15 days; then after a lapse of five days without medicine, give full doses three times a day for 10 days, then an interval of five days without medicine, and again full doses for 10 days; after which time there is complete cure.

"(e) In this time the patient if above 14 years of age takes nearly 1 lb. of Pot. Iodide and over 2 ounces of Sod. Salicylate; the cost of which is the one objection to the universal use of this method of treatment.

"(f) I attach photographs of one case treated by this method before and after treatment.

"(g) The time is too short to say whether the cure of these cases is permanent, but up to the present time, a full two months after treatment has been discontinued, there has been no return of symptoms."

A. P.

MISCELLANEOUS.

MADRAS. Annual Report and Statistics of the Government General Hospital for the Year 1915.—65 pp. fcap, 1916. Madras: Supt. Govt. Press.

Of the 500 beds available, two-thirds for non-Europeans and the rest for Europeans, 401·32 was the average occupied during the year. The total number of in-patients treated was 7,563 (1,823 Europeans)* and of out-patients 62,858 (5,900 Europeans). A table shows the deaths and their causes amongst Europeans and non-Europeans for the years 1914 and 1915. Of malarial fevers 8,821 cases were treated; of dysentery, 1,630. The malarial figures differ little from those of the preceding two years. It is noted that "little malaria was met with during the decennium 1903-1912, but since then Madras has been visited by a severe epidemic" [see this *Bulletin*, Vol. 5, p. 41].

Operations to the number of 2,740 were performed on in-patients with a mortality of 3·14 per cent.

Of enteric cases treated 91 were in Europeans and 124 in non-Europeans. In 1913 the number of non-European cases was 37, in 1914, 78, so that these figures "would seem to point to a very great increase in the incidence of enteric among non-Europeans."

The post-mortem examinations made numbered 84 (there were 440 deaths). A series of statistical tables follows. That below is made up from two, and shows some of the chief diseases as well as those usually recognised as tropical met with among European and Eurasians on the one hand and Indians on the other. [With regard to the heading "Rheumatic fever and rheumatism" it would be desirable if possible to have these conditions noted separately.]

	Europeans and Eurasians.	Indians.
Diseases of digestive system other than appendicitis	269	884
" " respiratory system except pneumonia and tubercle	134	214
Enteric fever	124	91
Malaria	104	261
Tubercle of the lung	89	254
Dysentery	83	246
Diseases of connective tissue	81	433
" " circulatory system	58	166
Pyrexia of uncertain origin	48	73
Syphilis	35	130
Diseases of liver other than abscess	23	146
Kala Azar	12	27
Anaemia	10	120
Abscess of Liver	3	14
Leprosy	2	9

The number of patients was, Europeans and Eurasians 1,823, Indians 5,740.

* This figure appears to include Eurasians.

A few observations may be culled from the special reports. Those from the physicians' wards show that benign tertian was seen four times as often as malignant tertian, but the entries of "chronic malaria" outnumber those of benign tertian. Four cases of infective granuloma were successfully treated by X rays. Major T. S. Ross, I.M.S., notes that in 90 per cent. of 138 cases of dysentery amoebae were found. There were "only a few patients with dysentery who were not also suffering from pyorrhoea alveolaris and out of 50 cases of the latter only in one case could no amoebae be found in the pus from the gums."

The Report contains much that is of value to those responsible for the management of hospitals in the tropics; the experience that has been gained may be judged from the fact that a table gives the Nominal Register of the Medical Officers of the hospital from the year 1830.

A. G. B.

SMITS (J. C. J. C.). **Mededeelingen uit het Centraal-Hospitaal der Sennah Rubber Company Ltd. te Bila (Oostkust van Sumatra). IV. Klinische aantekeningen op de jaarrapporten over 1914. Malaria, Dysenterie, Kala-Azar, Beriberi, Pellagra.** [Contributions from the Central Hospital of the Sennah Rubber Company, Bila, Sumatra. No. 4. Remarks on the Medical Report for 1914.]—*Geneesk. Tijdschr. v. Nederl.-Indië*. 1916. Vol. 56. No. 2. pp. 138-177.

This is a paper of observations, of the kind usually made by a medical superintendent, on the annual medical report of the above Company for 1914. The total number of workers employed by the Company is nowhere stated, but the admissions to hospital during the year amounted to 2,092, with 99 deaths, a seemingly very creditable figure, as the mortality amounts to a little less than 5 per cent. The number of admissions and of deaths shows a great reduction on former years, but the author very candidly remarks that all similar undertakings in the tropics show such an improvement automatically, in proportion as the estate is brought under cultivation, and the accommodation for the workers can be improved. The constant importation of fresh coolies on to such an estate with large spleens, or with chronic dysentery, forms a continual obstacle to a reduction in the amount of malaria and bowel-complaint met with on these undertakings, and is a constant thorn in the side of the medical officer. Quinine prophylaxis is not carried out on this estate but, as the next best thing, all sufferers from malaria, even women and children, are brought into hospital for treatment, and are made to sleep in mosquito-free wards, while the remaining patients sleep under mosquito-curtains, so as to obviate all further infection. The complete extermination of mosquitoes is prevented by the existence of uncontrolled native villages outside. Uncomplicated dysentery was met with in 125 patients, of whom 21 died, B. Flexner furnishing 73 cases, B. Shiga-Kruse 23, and amoebae 21, with 8 mixed infections. Two cases of pellagra were met with during the year. Of kala azar there were six primary cases, and one in which the lesions were found post-mortem, the death itself being due to malarial cachexia.

J. B. Nias.

- i. SITANALA (J. B.). **Report on the Medical Service of the Third Scientific Expedition to Southern New Guinea, 1912/1913, as it in so far pertained to the Charge.** [Also in Dutch].—*Mededeelingen van den Burgerlijken Geneesk. Dienst in Nederl.-Indië*. 1915. Vol. 4. pp. 1-14.
- ii. SWELLENGREBEL (N. H.). **Report about the Mosquitoes collected by the Native Medical Practitioner, Sitanala, during the 3rd Scientific Expedition to South New-Guinea, 1912-1913.** [Also in Dutch.] *Ibid.* pp. 15-16.

i. The region explored by the Expedition "comprised the Lorentz (North) river and the country between this river and Mount Wilhelmina." The force totalled 276 men. The Expedition lasted apparently from September 1912 to April 1913. Malarial prophylaxis was (1) according to KOCH, a 0.5 gm. tabloid of "quinine" every seventh or eighth day; (2) by the use of mosquito nets "which could not be properly closed on account of the overlap being insufficient"; (3) by fumigation with fresh wood fires. To ward off beriberi, fresh forest produce was collected and vegetables were sown at the camps. A table shows that the chief disease was malaria (diagnosed clinically). Large numbers of mosquitoes, chiefly *Anopheles*, were encountered. A list of the medicines and apparatus taken is given.

ii. Dr. Swellengrebel states that the mosquitoes reached him "in a very sad state." They were collected at three places and were all *Myzorrhynchus barbirostris*, which according to CHRISTOPHERS and STEPHENS is a host of *P. falciparum*.

A. G. B.

- de VOGEL (W. Th.). **Report about the Investigations carried out with Regard to the Sanitary Condition of the Port of Sibolga, Residency Tapanoei, from 24th April until 6th May 1913.** [Also in Dutch]. *Mededeelingen van den Burgerlijken Geneesk. Dienst in Nederl.-Indië*. 1915. Vol. 4. pp. 62-98. With 2 maps, 2 charts & 10 figs.

Sibolga is a port on the north-west coast of Sumatra with about 4,700 inhabitants. It is a very good anchorage and the Dutch colonial authorities propose to develop it. The author was sent to arrange the details of a scheme for improving the sanitation, with a view to laying out a township. The town is built at the mouth of a mountain creek on a narrow strip of coast backed by the steep Barissan mountains. Here *Nyssorrhynchus Willmori* [*Anopheles maculatus*], the carrier of malaria in the hills of the Malay peninsula, was sought for but was not found, and the results of spleen examinations render its presence improbable.

Dr. de Vogel's enquiries showed that almost everyone at Sibolga is attacked by malaria. Figures given show that splenic enlargement among children [ages not given] varied from 15 to 98 per cent., the last figure being obtained from an examination of 218 children. The species of *Anopheles* were determined by Dr. SWELLENGREBEL and the author as *A. ludlowi* and *A. rossi*. These were found chiefly in marsh. The bulk of the report is of local rather than general interest.

A. G. B.

THÉZÉ (J.). *Pathologie de la Guyane française (Paludisme, Fièvres continues et eaux de Cayenne, Dysenterie, Helminthiase intestinale, Lèpre, Filariose, etc.). Rapport sur les Travaux de l'Institut d'Hygiène et de Bactériologie 1914-1915.*—*Bull. Soc. Path. Exot.* 1916. June. Vol. 9. No. 6. pp. 376-402. With 2 maps & 3 charts; July. No. 7. pp. 449-469.

Malaria.—To this disease are due the numerous checks in colonisation of French Guiana since 1626, the date of the first occupation. The largest attempt was made in 1763 when 12,000 Frenchmen were disembarked at Kourou. In less than a year 10,000 were dead. Besides malaria they were attacked by dysentery and by what the author considers to have been typhus; it is doubtful whether yellow fever played any part. A similar tragedy on a smaller scale took place when victims of the Revolution were transported to this country. Later, the malaria was aggravated by (1) the abolition of slavery in 1848, because it led to the abandonment of clearing and cultivation, the best known methods of sanitation; by (2), the institution of the system of transportation (1852-4), because it continually brought in susceptible persons; and by (3) the discovery of gold in Guiana (1855), because it detached still more cultivators from the soil, and introduced large numbers of susceptible inhabitants of the Antilles. The population at the last census was 49,000.

The author then deals with the distribution of malaria. It is absent on the islands, common on most of the coast, especially between the capital, Cayenne, and the Oyapoc river, a region of great estuaries. The interior is believed to be free but most persons become infected on the river journey which must be taken to get there. The mosquitoes met with are *Culex pipiens*, *C. fatigans*, *C. albipennis*, *C. taeniorhynchus*, *Mansonia titillans*, a species of *Janthinosoma*, *Stegomyia calopus*, *Cellia argyrotarsis* and *C. albimana*. Concerning these two Anophelines the author writes: There is not a place in Guyana where one is not exposed to the bite of these carriers of malaria.—They are most numerous in the dry season when they breed in temporary collections of water. Figures are given showing the days of treatment for malaria at a penal station; it is calculated that for 4,000 men there were 100,000 days of illness. Pernicious attacks are common in October; they are accompanied by bilious vomiting and jaundice, and correspond to the description given by BAJON in 1777 under the name "*fièvre bilieuse ardente*." Blackwater fever is rarely met with (two cases in 1915) though circumstances seem to favour it, and quinine haemoglobinuria is unknown.

In 577 positive blood examinations in 1915 *Plasmodium vivax* was found 218 times, *P. praecox* [*falciparum*] 335 times and *P. malariae* 24 times. Of the malignant tertians crescents were met with in 14 per cent., though only one or two slides were examined. In this the author finds that the malaria of Guiana resembles that of Upper Tonkin and Morocco. The frequency of crescents is attributed to the poor general state, defective diet, alcoholism, presence of intestinal parasites, etc.

In his consideration of prophylaxis the author points out that all the conditions in Guiana favour a high coefficient of endemicity, viz., the susceptibility of the population, ubiquity of anophelines, and frequency of gametes in the blood. His two years experience has shown him that

reinoculation is so frequent that the most solid immunity soon breaks down. Nothing hitherto has been done to prevent malaria. The population is scattered over vast areas; little money is available; there are 30,000 persons without medical assistance or direction in health matters. An "offensive prophylaxis" is consequently impossible; one must fall back on education and instruction in schools. Other measures recommended are concerned with the sale of quinine to the public, its distribution in schools, and its obligatory administration in penal settlements, and the installation of metallic wire gauze for workmen.

Continued fevers.—Typhoid fever, common in British Guiana [this *Bulletin*, Vol. 6, p. 240], is rare. It is met with most frequently in the penal settlements where it spreads by direct contagion. At Cayenne only three cases were seen in 1915, all paratyphoid A. The water supply of this place is described with a map. The water is collected in reservoirs 12 kilos away, and chemically and bacteriologically is very good. In the dry season however the supply has to be much restricted. Consequently the people have to store it and *S. fasciata* flourishes.

Dysentery.—Amoebic dysentery is rare. It was seen only 29 times in 20 months. It is usually mild. Bacillary dysentery has been recently detected and is believed to be common, though mild in type. A bacillus of the Flexner type has been isolated five times.

Intestinal helminthiasis.—Reference is made to papers on this subject by BRIMONT.* The author has examined 1,282 stools with the following results:—

Ankylostomes	..	..	..	found	607	times.
Ascaris	..	..	..	..	218	..
Trichocephalus	..	..	..	..	220	..
Oxyuris	..	..	..	..	8	..
Dipylidium of the dog	..	..	..	..	2	..
Anguillula	..	..	..	..	6	..
<i>Schistosomum mansoni</i>	..	..	..	..	3	..

Multiple infections were frequent.

Ankylostomiasis is general. Of the hospital patients 57 per cent. are infected, in the penal settlements 80–85 per cent. Ground itch is common at the commencement of the rains. Vigorous treatment with thymol has been successful in some 200 cases, but this must be carried out in hospital and is unsuitable for all. The author has therefore adopted and modified the method of FERGUSON of Georgetown [this *Bulletin*, Vol. 4, p. 525]. A cachet of 75 cgm. of beta-naphthol is given every morning for a month, without change of diet; the worms often disappear after three weeks. At Cayenne and other towns, the night soil is dumped just outside and is washed by the rain into a canal which runs close to the town. Septic tanks at the edge of a creek are advised.

Intestinal bilharziasis.—Four cases have been seen, all in persons from the Antilles. Two of them had been in Guiana twelve years. However the author is unable to affirm that they are not imported cases.

**Bulletin de la Société Pathologie Exotique.* 1909. Vol. 2. pp. 413 and 423.

Animal helminths.—*Haemonchus contortus* is common in sheep, causing pernicious anaemia. *Syngamus trachealis* is met with in fowls.

Leprosy.—An interesting section occupying 16 pages, which can be noticed only briefly. The history of the regulations made for the control of the disease is given from 1685 onwards. At first very strict, they were modified from time to time, always in the direction of laxity, till at present no regulations are really operative. Leprosy has however increased. The author says it is impossible to get the exact figures but he estimates from personal enquiry that there are about 83 lepers at Cayenne and about 300 in the whole colony. Of the Cayenne cases 33 are of the macular kind and of an average age of 13, and it is stated that it is characteristic of leprosy in French Guiana that it attacks chiefly children. Almost all the lepers belong to the poorer classes. The indigenous Indians escape. The author discusses the means of prevention at length, and concludes that the chief hope lies in school inspections which would "lead without fuss to the discovery of more than three quarters of the future infectives."

Filariasis.—This infection is widely spread; all its manifestations are common. A single examination of 133 persons at the hospital was positive in 37 instances, i.e., 28 per cent. were carriers of *Mf. nocturna*, and this figure would be a minimum because 24 of the patients had elephantiasis. *Mf. Demarquayi* was met with three times. An undetermined microfilaria was met with in three members of a family: in a woman and her daughter in small subcutaneous tumours, in one case in the inguinal region, in the other below the breast; in the husband of the first in the urine, associated with *Mf. nocturna*. Measurements are given. It was never found in the blood. "All its characters, as well as the lesions observed in the patients, bring it near to *Mf. volvulus*, if this species existed in America."

Tuberculosis.—This disease is not common. Hospital figures are given. The patient succumbs before he can spread the infection much. The disease however is spread by human contagion alone.

Syphilis is increasing. Of 169 Wassermann reactions 89 were positive.

Leishmaniasis of the skin and mucosa.—This is contracted in the forests of Upper Guiana. The parasites are easily found in young lesions, with more difficulty in old. Lesions of the mucosa are rare and never of the malignancy described by South American authors. Recovery is spontaneous after two or three years.

Toxoplasmosis was seen in a howling monkey, which died at the Laboratory.

A table is given of the 2,654 examinations made month by month in the laboratory in 1915.

In the author's conclusions he states that malaria, ankylostomiasis and leprosy are the chief diseases of French Guiana, all preventable. "To spend money on hygiene in a country like this is not only benevolence; it is also good business; without hygiene it is illusory to expect the Colony to go forward."

A. G. B.

ALGÉRIE. Rapport sur le Fonctionnement de l'Institut Pasteur d'Algérie en 1915. [Edmond SERGENT, Directeur.]—20 pp. With 1 chart. 1916. Alger: E. Pfister.

A large quantity of anti-small-pox, anti-enteric, and anti-cholera vaccine was prepared during the year for the army. Since October 12, 1914, a polyvalent anti-enteric vaccine has been used. The strains of paratyphosus A and B were obtained from Algerians. The vaccine contains 600 million bacilli per cc. Four doses are given of this, or a total of 3,300,000,000 microbes. Sufficient to vaccinate 90,716 men was prepared; the civil population serves as control.

The number of analyses made has risen from 3,506 in 1914 to 5,938 in 1915; their purposes are tabulated.

In the anti-rabic Section 1,565 persons were treated. Four died later than fifteen days after the cessation of treatment, giving a mortality of 0.25 per cent. Rabies was diagnosed in the biting animals in the laboratory or by a veterinary surgeon in 708 instances; there was a suspicion only in 870 cases. The animals were dogs, 942, cats 52, donkeys 8; the remaining 12 being horse, camel, goat, rat, rabbit and man. The number of persons treated is the highest recorded, the cause being relaxation of police measures owing to the war. The reservoir of the virus here as elsewhere is stray dogs.

Antimalarial measures have been continued despite a decrease in the personnel; 51,000 francs were expended. A chart shows the doses of antivariola vaccine sent out week by week; the highest reached was about 45,000. Many other vaccines and serums were prepared for both medical and veterinary use. Viruses for the destruction of rats and locusts, and diagnostic reagents were also turned out.

An account is given of the research work. In malaria it is found that the reduction of the reservoir by the quininisation of old paludics is the measure that is easiest applied in Algeria, but all preventive measures are practised where possible. SERGENT and FOLEY find that oil of eucalyptus, which is an African product, destroys body lice, penetrating clothes, when used in the proportion of 1 cc. to 125 square cm. of cloth. The clothes need not be changed. This method has been used by doctors, officers, and men at the front with complete success. A study is being made, by means of the tuberculin cutaneous reaction, of the degree of tubercular infection of Algerian natives; so far it has been ascertained that the degree of latent infection in a given native community varies with the distance which separates the community from the nearest European settlement; the nearer the European the greater the degree of infection. The effects of other researches which are detailed will be found in the pages of this or the *Tropical Veterinary Bulletin*.

A. G. B.

HENAO M. (Emiliano). Informe del Médico Jefe del Departamento di Sanidad del Ferrocarril de Antioquia para la Asamblea de 1915. [Report of the Medical Director of the Sanitary Department of the Antioquia Railway [Colombia], for the Year 1915.] pp. 83-100. With 2 charts. Medellin: Imprenta Oficial.

The successful result of railway enterprise in the tropics depends as much as anything upon the care taken of the health of employes.

The gradients of railways generally require them to be taken along valleys in the proximity of malaria, and stations have to be located, as the traffic requires, in spots that are often extremely unhealthy. In addition a railway, if it communicates with the coast, is an excellent channel for the dissemination of yellow fever, and such diseases as dysentery and typhoid. A great responsibility therefore rests on those in sanitary charge of large undertakings of this kind. The present report is commendably brief in its letterpress, but is on the other hand extremely well furnished with tabular statistics. The mortality among the employes for the year under notice appears to have been most gratifyingly low, there being only 14 deaths in 2,206 cases taken into hospital. Of these, two deaths were due to yellow fever, one each to bacillary dysentery and typhoid, and, strangely enough, three to influenza. Injuries on the railway caused only one death. Quinine was regularly distributed among the employes, to the number of 642,000 pills. The result is seen in Chart No. 1. On the commencement of the distribution of quinine in the middle months of 1914, the monthly percentage of sick from malaria dropped from 9 per cent., to between 2 and 1 per cent. in the succeeding months.

J. B. N.

ARCHIBALD (R. G.), HADFIELD (G.), LOGAN (W.) & CAMPBELL (W.).

Reports of the M. and H. Laboratories dealing with the Diseases affecting the Troops in the Dardanelles.—*Jl. Roy. Army Med. Corps.* 1916. June. Vol. 26. No. 6. pp. 695-724. With 10 charts.

This paper deals with the work carried out at M. E. laboratory during a period of five and a half months, August 1st, 1915 to January 15th, 1916, and with that at the H. laboratory from September 4th to the time of the evacuation. M. was only a few hours distant from the Peninsula. The authors write :—

"During the months of June, July, August and September there was a low rainfall accompanied by a comparatively high temperature and an affluence of flies and dust—in short, an ideal state of things well fitted for the spread of fly- or dust-borne diseases.

"In October and the following months the fall in the temperature and the increased rainfall had a determining influence in the diarrhoea and amoebic dysentery incidence. The former practically disappeared, while the latter was almost entirely replaced by the bacillary type of the disease. It was also observed that, coincident with the change in the climatic conditions, there was an increase in the paratyphoid A incidence; indeed, during the months of December and January it had almost entirely taken the place of the paratyphoid B infection."

The Dysenteries.—From July to October the type prevalent was the amoebic. Other organisms were always sought. "In the majority the exhibition of emetine was a therapeutic success provided that a total amount of ten grains had been administered over a short period."

In December the sole type of dysentery was bacillary. The cases responded in a striking manner to a polyvalent-dysentery serum. Among 69 organisms isolated B. Shiga was obtained 35 times, B. Flexner 23, and in 11 instances the type was unidentified owing to failure to respond to specific agglutination tests. Of 518 dysenteric stools 70 per cent. were due to amoebae, 13 to bacilli, and in 17 per cent. no causal organisms were found.

The Diarrhoeas.—These were very prevalent in August to October. Under heading “sand-diarrhoea” a common type is discussed but the authors seem to think that flies were at least equally responsible. “The predominant organism was a non-lactose-fermenting diplostreptococcus which grew readily on McConkey’s medium in the form of delicate, clear colonies.” *Trichomonas intestinalis* was observed on 57 occasions.

Malaria.—Subtertian parasites were found twice, and benign tertian 24 times. Anophelines were found breeding in the vicinity of H.

Relapsing Fever.—Forty-six cases were diagnosed by blood examination. There were two types. One was more severe; jaundice and liver and splenic enlargement were invariably present, and pulmonary symptoms were absent. In the other jaundice and splenic enlargement were uncommon, and pulmonary symptoms were usually present.

Infective Jaundice.—Evidence is still lacking as to whether an organism is concerned in the etiology of this condition. Blood cultures indicate that bacillaemia is the exception.

Typhoid and Paratyphoid Fevers.—These are considered at some length—methods, clinical features, duration of the bacillaemia, characters of the bacilli, preventive inoculation, course of the epidemic, other organisms in the blood, concomitant infections. The section is summed up thus:—

“(1) The total typhoid incidence was very low.

“(2) The results showed the efficacy of typhoid inoculation against typhoid fever and its inefficacy against paratyphoid.

“(3) Blood cultures should always be done in the first week in cases with the symptom group already described.

“(4) Attention is drawn to the epidemic of paratyphoid B fever during September and October and the first half of November, and its sudden substitution then onwards by paratyphoid A fever.”

The last ten pages contain notes from the Cape H. Laboratory by Lieut. W. Campbell. It is stated that the bulk of the records were lost during the evacuation.

Water Supplies.—Much time was spent in the bacteriological examination of water supplies. “In the vast majority of samples *B. coli communis* was recovered from 0.01 cc. of specimen.” *B. paratyphosus* B was isolated from a shallow well. Chlorination was never performed at less than one part per million available chlorine, and chlorination at four parts gave the best results. “The experience at H. has shown that there can be no question regarding the value of chlorinating doubtful or bad water supplies.”

Amoebic Dysentery.—In over 150 cases of dysentery examined in September and October 65 per cent. of stools contained entamoebae, the characters of which are given.

Bacillary Dysentery was rare; *B. Shiga* was found in five cases, *B. Flexner* in one.

Flagellate Diarrhoeas.—*Trichomonas* was found to be the agent in eight cases. They were treated by “the exhibition of a solution of potassium permanganate and rectal injections of quinine (strength 1 in 5,000).”

Epidemic Jaundice.—Catarrhal jaundice formed the greater part. A chart is given showing the relationship between prevalence of (C307)

diarrhoeal diseases and jaundice. The former are seen to be most prevalent in August and September, especially September, the latter in October. No evidence was obtained of a specific micro-organism.

Diphtheria was not infrequently met with. It was mild. Two carriers were detected.

Gallipoli Sore.—This is the septic or trench sore common among the troops on the Peninsula.

"The lesions were divisible into primary and secondary—the primary being traumatic ulcers and the secondary being vesicles, which later developed into ulcers simulating those of the primary lesions. The favourite sites of the primary lesions were the posterior aspects of the fingers and the dorsal metacarpal areas of the hands; while those of the secondary lesions were both aspects of the forearms and hands, though the upper arms and the lips were by no means immune."

"The only organism constantly present in the lesions was a Gram-positive diplococcus which could always be obtained on culture as well as demonstrated in direct preparations from the sores and vesicles."

A slight injury was in most cases antecedent. The primary lesions were indolent ulcers "taking anything between two weeks and three months to heal." The secondary lesions usually ended in similar ulcers.

A. G. B.

JOHNSTON (J. E. L.). *A Summary of an Entomological Survey of Kaduna District, Northern Nigeria*.—*Bull. Entom. Res.* 1916. May. Vol. 7. Pt 1. pp. 19–28. With 2 sketch maps.

The centre of the district surveyed was the native town of Doka, near the site of the future capital of Nigeria, on the river Kaduna at 2,200 feet. It was made in August 1914 "in unusual weather conditions"; the rainfall for the year had been little more than half of that for the first eight months of 1913. Several places within 20 miles were visited. Sketch maps show the position of the herds of cattle examined and where tsetse flies or infected cattle were found. Though only three *Glossina* (one *tachinoides*, two *palpalis*) were caught there is no doubt that they occur elsewhere. Of 150 blood films examined from cattle 12·6 per cent. showed trypanosomes, and 26 per cent. piroplasms. The trypanosome "in most cases was of the *T. vivax* type." Of the mosquitoes caught *Culicomyia nebulosa* formed 51·8 per cent., *Anopheles costalis* 14·19 per cent., *Culex duttoni* 14·19 per cent. The rest include *Culex fatigans* and four species of *Stegomyia* (*S. fasciata*, 3·7 per cent.). A list of the Culicidae, Tabanidae, Muscidae, Hippoboscidae and Ixodidae obtained, with localities, concludes the paper.

A. G. B.

CARTER (HENRY F.). *On Three New African Midges*.—*Ann. Trop. Med. & Parasit.* 1916. Apr. 29. Vol. 10. No. 1. pp. 131–138. With 1 plate.

The midges described belong to the Ceratopogoninae sub-family of the Chironomidae. Whether they are blood-suckers is unknown. One, a genus of *Forcipomyia*, Meig., comes from the Gold Coast (Le FANU); the others are species of *Culicoides* and were collected near the Gizeh Pyramids by Professor J. W. W. STEPHENS. The plate contains six figures.

A. G. B.

MACFIE (J. W. Scott) & INGRAM (A.). **New Culicine Larvae from the Gold Coast.**—*Bull. Entom. Res.* 1916. May. Vol. 7. Pt. 1. pp. 1-18. With 14 figs.

The larvae here described, with figures, are those of *Stegomyia metallica* Edw., *S. luteocephala* Newst., *Ochlerotatus irritans* Theo., *O. sudanensis* Theo., *Culex pruina* Theo., *Culex* sp. ?—attributed by Dr. W. M. GRAHAM to *Culex pruina* Theo., *Culex insignis* Carter, *C. ingrami* Edw., *C. consimilis* Newst., *Eumelanomyia inconspicua* Theo., *Mimomyia hispida* Theo., *Uranotaenia annulata* Theo., and *U. alboabdominalis* Theo. Their breeding places are given.

A. G. B.

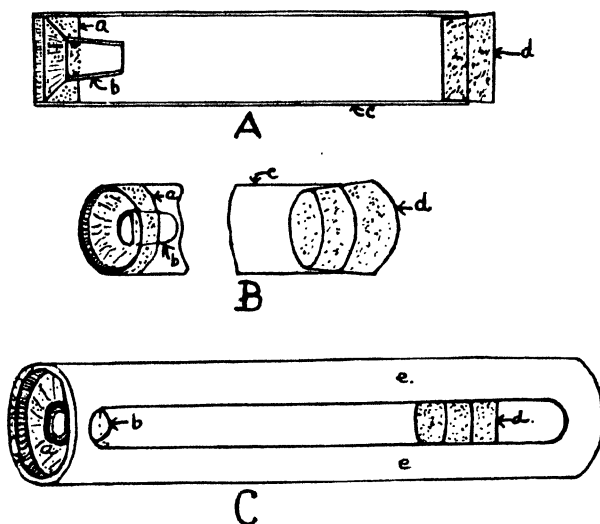
GRIFFITHS (T. H. D.). **A Mosquito Collecting Device.**—*Jl. Amer. Med. Assoc.* 1916. July 8. Vol. 67. No. 2. p. 117. With 3 figs.

The figure and description give a good idea of this trap, which seems to be specially suitable for catching uninjured living specimens. The truncated cone may be made of glass or celluloid, or the whole may be made of celluloid, which has the advantage of lightness and being non-breakable. The trap end is placed over the mosquito which passes at once into the tube. Escape appears to be a rare event. Ten mosquitoes are probably sufficient for one tube if they are to be used experimentally in the laboratory, but they can of course, as caught, be transferred to other containers.

A—Longitudinal Section.

B—View showing trap device placed in tube.

C—Collection device in wooden case to prevent breaking.



Device for collecting mosquitoes: *a*, funnel-shaped cork stopper three-eighths inch thick having central opening half an inch in diameter; *b*, small glass tube of truncated cone shape three-fourths inch long; diameter of large opening, half an inch; of small opening, three-eighths inch; *c*, glass tube 5 inches long, 1 inch diameter, open at both ends; *d*, cork stopper for untrapped end; *e*, wooden cylinder to prevent accidental breaking of tube.

A. G. B.

BALFOUR (Andrew). *Fly-Traps for Camps, Hospital Precincts and Trench Areas.*—*Jl. Roy. Army Med. Corps.* 1916. July. Vol. 27. No. 1. pp. 61-72. With 9 figs.

The fly traps described were devised by Balfour in conjunction with an engineer, Mr. W. H. McLEAN, and Mr. SMITH, manager of Luna Park, Heliopolis. They are three in number and are alike in essential particulars, differing chiefly in size and cost. The flies enter through slits under wire netting. The intermediate form, which is recommended for camps, is constructed of wood, canvas, glass and wire gauze and in Egypt costs about £4. It weighs 96 kilograms.

"Its powers of attraction depend on three main factors—i.e., the fact that it is well lighted, the fact that the air in its interior is warmed by means of the glass roof or, if necessary, by using a small native charcoal stove, and the fact that it can be baited with material most attractive to flies. No doubt, also, the presence of flies in the trap serves to attract others to it . . . Very few flies leave the trap once they have properly entered it, for they find it is all they desire in the way of food, warmth, light and shelter."

The baits are jam, marmalade, milk and sugar, used damp tea-leaves, cheese, a paste made of lentils, etc., which are placed on a shelf running round the interior. Chicken entrails are very effective. Fish refuse and human excrement (protected by gauze) may also be used. To get rid of the flies Keating is introduced on an enamel plate placed over the charcoal stove. All the traps have been tested at Luna Park.

Illustrations are given and plans. "In 24 working hours" the intermediate trap "may easily catch 10,000 flies."

It is admitted that they will never solve the fly problem, but it is claimed that they will be useful auxiliaries.*

A. G. B.

TOWNSEND (C. H. T.). *A New Generic Name for the Screw-Worm Fly.*—*Jl. Washington Acad. Sci.* 1915. pp. 644-646.

After a careful examination of the subject Townsend finds that there is no generic name in existence which can be used for the screw-worm fly, hitherto known as *Chrysomyia macellaria*. *Chrysomyia* will not do because this genus is confined to the Old World and the New World species are generically distinct. Other names fail for reasons cited. He therefore supplies the deficiency, giving the name *Cochliomyia*, and defines the new genus. It appears to be grouped with *Pollenia*. The writer has collected a species of *Cochliomyia* in the Andes at 12,000 feet, which is distinct from *macellaria*.

A. G. B.

*Those interested in fly traps should consult also "Flytraps and their Operation," by F. C. BISHOPP, *Farmers' Bulletin*, 734. 1916. June 10. U.S. Dept. Agriculture, Washington, D.C. Five sorts of traps are figured.

- i. PEACOCK (A. D.). **The Louse Problem at the Western Front.**—*Brit. Med. Jl.* 1916. May 27. pp. 745-749. With 8 figs.; June 3. pp. 784-788. With 2 figs.; and *Jl. Roy. Army Med. Corps* 1916. July. Vol. 27. No. 1. pp. 31-60. With 10 figs.
- ii. KINLOCH (J. Parlane). **An Investigation of the Best Methods of Destroying Lice and Other Body Vermin.**—*Brit. Med. Jl.* 1916. June 3. pp. 789-792.
- iii. BACOT (A.). **Notes on *Pediculus humanus (vestimenti)* and *Pediculus capitis*.**—*Ibid.* pp. 788-789.

i. This paper is divided into sections: Entomological, "Lousiness," Dissemination of the Pest, Methods of Prevention and Destruction, and Recommendations. Under the first heading the morphology, habits and instincts of *Pediculus humanus* are considered. It was found that the longest period during which lice survived separation from the body was nearly nine days. The maximum time for which eggs away from the body may remain dormant is about forty days (WARBURTON); hence untreated clothing is a possible source of infestation for more than a month.

Under the second head the author describes his method of estimating the degree of lousiness of men or a unit. Ninety-five per cent. of the men of one division were infested. A prevalent term is "lousy dug-outs"; observations however showed that dug-outs play a minor part in the harbouring and dissemination of the parasite, and the same applies to blankets. Under Dissemination it is shown that the soldier himself is chiefly responsible.

Methods of Prevention and Destruction.—The best all-round vermicide tested was N.C.I. (naphthalene 96 per cent., creosote 2 per cent., iodoform 2 per cent.). The effect of one thorough application down the shirt and trousers is said by the men to last four-five days. It is recommended to use an ointment insecticide at the fork, as N.C.I. causes smarting. "Vermijelli" is effective if the body is anointed from neck to knees. Mercury ointment and sulphur proved useless. Both lice and their eggs are killed when shirts are boiled for five minutes in water, or thoroughly soaked in $1\frac{1}{2}$ per cent. cresol cold for one hour. Outer garments should be hot-ironed at least once a week. In the recommendations the author outlines a plan of campaign against the pest.

ii. The first communication of Dr. Kinloch, who is Lecturer on Public Health at the University of Aberdeen, was published in the *British Medical Journal*, June 19th, 1915 [pp. 1038-41]. He also finds that N.C.I. powder is destructive to lice, and the most so of any powder tested. Of its three constituents naphthalene and creosote have each a strong insecticidal action. Commercial naphthalene is more active than pure naphthalene, apparently owing to the presence of hydrocarbons and coal tar derivatives. The inclusion of iodoform is justified by the fact that it "greatly increases the adhesiveness of N.C.I. powder for cloth," but the same object may be attained by the substitution of the much cheaper magnesium silicate. The N.C.I. mixture gradually loses insecticidal power when exposed to the air. It is too moist to be used successfully in perforated tins. It should therefore be supplied in sealed tins. The author believes that "the application of such powders twice weekly to clothing would destroy

any lice that might be present, and would practically keep the persons lice-free." While sulphur dioxide is the most efficient gaseous insecticide, as ordinarily used it cannot be depended on to kill all lice in verminous clothing. Clothing may be cleansed by immersion in petrol, all precautions against fire being taken. For the cleansing of verminous heads tetrachlorethane is advised.

iii. Observations and experiments on *P. humanus* and *P. capitis*, their habits, length of life, hatching of eggs, etc. The complete paper is to be published in the *Journal of Hygiene*.

A. G. B.

An account of a Discussion on Lice at a meeting of the Anzac Medical Association held at Anzac, Gallipoli, in November, 1915, is appended, as showing what measures were found of most value under, at times, sub-tropical conditions.*

Major BUTLER, D.S.O., pointed out that the fact that a large proportion of the men had no second set of clothes was a bar to bulk disinfection of clothing. He stated that the following were the most practical methods at disposal for dealing with the pest and that as many combinations as possible should be used.

- " (1) Steam sterilization of clothes and blankets.
- " (2) Deposition under the seams of the clothing of some substance such as *vermijelli*, or a mixture of soft soap and crude oil, or the use of some mineral oil, *e.g.*, kerosene, petrol, etc.
- " (3) The use of N.C.I. powder (2 per cent. iodoform, 2 per cent. creosote and 96 per cent. naphthalene).
- " (4) The use of 'Keating's' or other insect powders or a bag of sulphur worn round the neck.
- " (5) Mercurial ointment on strands of wool, worn round the neck, waist and calves of legs.
- " (6) Hot ironing the seams of clothing.
- " (7) Individual search and picking of all clothing.
- " (8) Regular changing of clothes once a week.
- " (9) Regular bathing and general personal cleanliness.
- " (10) The use of an emulsion of 1/2 per cent. lysol and 20 per cent. soft soap, to be lathered on the skin and allowed to dry.
- " (11) The cleaning and sterilization or fumigation of blankets and dug-outs (*e.g.*, by sulphur dioxide).
- " (12) The immediate destruction by burning of all discarded clothes, etc."

[He did not state whether the value of each had been demonstrated in the field.]

Captain PHIPSON remarked that while a louse feeds it excretes a substance attractive to flies and that this might be a factor in the spread of some diseases. He believes in personal cleanliness, daily search of the clothes, baths, change of clothes once a week at least, and N.C.I. powder.

Major BATTYE, I.M.S. was a strong advocate of disinfection by sulphur dioxide "which, if properly carried out, killed both lice and nits."

**Medical Journal of Australia*, 1916. Apr. 22. Vol. 1. 3rd Year. No. 17. pp. 337.

Lieut.-Col. DUDGEON, Advisory Committee, stated that sulphur disinfection was greatly used among the French troops and proved very effective. "Solar oil (kerosene minus the benzine) was greatly used along the Suez Canal for rubbing into the seams of the clothes; failing this, kerosene was as good."

Col. HOWSE, D.D.M.S. thought that Medical Officers should impress on the men "the need for constant hunting and destroying of the louse."

A. G. B.

HERMS (William B.). *The Pajaroello Tick (Ornithodoros coriaceus Koch), with Special Reference to Life-History and Biting Habits.*—*Jl. Parasitol.* 1916. Mar. Vol. 2. No. 3. pp. 137-142. With 1 fig.

There are various stories about this tick, all agreeing in the essential detail "that the bite results in an irritating lesion which is slow to heal and often leaves an ugly deep scar." It comes from the more mountainous portions of Mexico and California. It is superficially "not greatly unlike" *O. moubata*. An account is given of the life-history and breeding habits. From the egg to sexual maturity at 26.3° C. 159 days are required for the male, and 343 days for the female. The effect of two bites in man is described. The first, on the arm, gave little immediate trouble. Three hours after the second bite "just above the shin" (a fortnight later), the entire lower leg was "tremendously swollen" and a clear lymph exuded from the lesion. The leg was lanced. Lymph exuded from this bite for several weeks, and also from that on the arm, which was apparently quiescent up to the date of the second bite. The presence of the ticks seemed to be determined by the presence of cattle. An account is given of bites inflicted in the laboratory on monkey, rabbit and mouse. In no case was there any systemic disturbance.

A. G. B.

MCCAFFREY (D.). *The Effect of Tick Bites on Man.*—*Jl. Parasit.* 1916. June. Vol. 2. No. 4. pp. 193-194.

The author, who writes from Princetown in British Columbia, near the U.S.A. boundary, describes three cases illustrating the effect of tick bite on man in that locality. In the first two the symptoms were local, suppuration occurred, and a "punched-out" ulcer was left with intense itching. He has seen only one case in which there were constitutional symptoms. A girl of eleven gradually lost the use of all her limbs, then the pupillary action to light. There were choreic movements and, later, incontinence of urine and faeces. Liquids returned by the nose. The temperature first rose one degree, then dropped below normal. On the seventh day a tick was removed "near the crown of the head." Recovery was rapid and on the third day she walked up the street. The tick was identified by Dr. S. HADWEN as *Dermacentor venustus*. [For previous summaries on this subject see this *Bulletin*, Vol. 4, p. 407; Vol. 5, p. 433.]

A. G. B.

CORNWALL (J. W.). *Some Centipedes and their Venom.—Indian J. Med. Res.* 1916. Jan. Vol. 3. No. 3. pp. 541-557. With 5 plates.

After an Introduction, in which the author points out how little has been put on record about centipedes and their venom, the paper is divided into three parts: (1) anatomical and histological, which is fully illustrated; (2) the effect of centipede bites; (3) some properties of the glandular secretion. Three species of Scolopendridae were dealt with—*Ethmostigmus spinosus*, *Rhysida* sp. ?, and *Otostigmus* nov. sp. ? The author's summary is as follows:—

"1. The orifice of the venom duct is oval and lies on the dorsal surface of the venom claw, nearer the greater curvature and at a little distance from the apex.

"2. Centipedes possess four distinct pairs of glands with ducts opening near the head:—

"(1) Anterior salivary glands.

"(2) Posterior salivary glands.

"(3) Third pair of glands.

"(4) Venom glands.

"3. Centipedes have definite ductless haemopoietic organs.

"4. The toxic action of the venom is relatively low and is a character of secondary importance. The main function of the venom gland is probably to secrete digestive ferments, not to furnish a lethal agent.

"5. Extract of the salivary and the third glands contains lysins, which are selective, anti-coagulin, diastase, invertase, and proteolytic enzymes."

A. G. B.

HOLT (Joseph J. H.). *The Cockroach: Its Destruction and Dispersal. A Comparison of Insecticides and Methods.—Lancet.* 1916. June 3. pp. 1136-1137.

The author experimented with a large number of substances, testing liquid volatile bodies in a wide-mouthed, glass-stoppered bottle of about 1250 cc. capacity, about one dram of the liquid being sprinkled on lint and suspended in the bottle. Dusting powders and food poisons were tested in shallow trays. The results are tabulated. It may be stated that formaldehyde, naphthalene, paraffin (burning oil), Dalmatian and Keating's insect powders and, amongst foods, arsenic and Blattis were relatively ineffective. The cockroach may exist 76 days without food. The author writes:—

"Summarising the results of the experiments as a whole, they seem to indicate that many of the substances which have been supposed to kill the cockroach have really acted by driving it away and so leading to its disappearance. Such gregarious migrations have been observed but have hitherto been otherwise explained. For quick destruction stoving with bromine or sulphur dioxide is apparently best. For domestic application the daily use of creosote, wood naphtha, or the oil of rosemary, eucalyptus, or citronella placed near the haunts of the cockroaches for two or three weeks should effectually disperse them. Where these are inadmissible on account of their smell, odourless dusting powders may be used. Of these sodium fluoride was found to be the most effective. It is also cheap and keeps indefinitely.

"These experiments may have some value as applied to insect pests. The cockroach being abundant and of large size, it has been possible to use it as an 'indicator' and to observe the results more accurately than would be possible with small insects. Other things being equal, the same results should follow in the case of many other insect pests."

["Other things" seem rarely to be 'equal' in the case of insect pests. It does not appear that the author tried any of the substances named in the insect's natural haunts.]

Mr. HOWARTH* of the Museum, Sheffield, criticises Dr. Holt's methods, pointing out that an insect confined in a narrow space with its favourite food may decline to eat it and relates how a large Poor-law institution was rid of the pest by putting down *Blattis*, not only in the kitchens but in a dark room where the cockroaches congregated. The effect is heightened by their cannibalistic habits. Surgeon BURTON-BROWN,* R.N., writes that he rid a newly-built house by putting down insect powder along the floor near the walls.

A. G. B.

BAETZ (Walter G.). Syphilis in Colored Canal Laborers—a Resumé of 500 Consecutive Medical Cases.—*Proc. Med. Assoc. Isthmian Canal Zone.* Apr.-Oct. 1914. [1916]. Vol. 7. Pt. 1. pp. 17-33.

The 500 cases upon which this paper is based were admitted to the adult, male negro, medical wards at Ancon Hospital from December 1911 to October 1913, a period of 23 months. Cases admitted to the surgical wards and special departments are not included. There was a total of 8,226 patients admitted during that period, so that 6 per cent. of the admissions are known to be syphilitic. The physical examinations were made by numerous physicians. "The notes made, consequently, reflect the chief reasons advanced for the established diagnosis, rather than an itemised account of the patients' total physical abnormalities." The author notes that some of the diseases of temperate climates are practically unknown in the tropical native and others show peculiar variations. As an instance of the first he gives acute articular rheumatism, scarlatina and tabes dorsalis. It is shown in this paper that certain syphilitic manifestations are much more prevalent in tropical negroes than among Caucasians.

Most of the patients are brought to hospital by pain and disfigurement. "A macular syphilide will be entirely overlooked or ignored by the patient because it seldom occurs on the face, while a papulopustular eruption, commonly seen there, will bring the sufferer to the physician post-haste." Of the 366 cases which applied for treatment solely because of the syphilitic infection, pain, particularly nocturnal, was the chief complaint in 277. The pain was in the larger joints in 136 and in the bones in 47.

Table showing the Relative Frequency of Syphilitic Manifestations
Noted in 500 Consecutive Medical Cases of Syphilis in Negroes.

	Cases.	Per cent.
1. Adenopathy	440	88
2. Genital chancre or scar	326	65
3. Arthritis, periostitis, exostoses	301	60
4. Cerebrospinal lesions	182	36
5. Skin lesions	140	28
6. Cardiovascular lesions	50	10
7. Gummata and visceral infiltrations	25	5

**Lancet.* 1916. June 10. p. 1192.

Physical Signs and Observations.—The percentage of glandular enlargement given in the table is too high to be correct as far as syphilis is concerned. Tinea cruris is well-nigh universal among the patients and accounts for much of the enlargement.

With regard to the initial lesion this was found in 38 and a scar, or scars, in 288. There is an error here in that a genital scar is more apt to result from a chancroid than from a chancre; on the other hand "it is not so rare as might be thought" to find a case of well defined secondary syphilis in which there has been no chancre.

The involvement of the bones and joints is far in excess of that which occurs in the Caucasian. Among the 301 cases there were exostoses of the tibiae in 131, acute and sub-acute arthritis and bursitis in 88, acute periostitis of the sternum and tibiae in 32, as well as in the sternum alone in 24, and tibiae alone 18. Except for skin lesions "this involvement of the osseous and articular structures was our one best sign in the diagnosis of syphilis." It is noted that acute articular rheumatism has often been diagnosed where the true diagnosis was syphilis [see this *Bulletin*, Vol. 6, p. 430].

With regard to the lesions of the nervous system there was no case of tabes dorsalis or dementia paralytica. Among the 182 cases in the table there were increased knee reflexes in 95, diminished knee reflexes in 30, unequal knee reflexes in 5, cerebral haemorrhage or softening 13, palsies of the cranial nerves in 12, ataxia or staggering gait in 7, epileptoid seizures in 6. The clinical diagnosis was confirmed by anti-syphilitic treatment or a positive Wassermann. "It is probable that a considerable number of cases diagnosed beriberi in some parts of the tropics are in reality manifestations of syphilis of the nervous system, not uncommonly in patients with a liberal admixture of chronic alcoholism."

Among the 140 skin lesions there were papular syphilides 19, papulopustular 14, maculo-papular 4, pustular 4. There were only 23 ulcerative lesions, but it is noted that extensive ulcerations would be admitted to the surgical wards.

Among the 50 lesions of the vascular system there were aortitis 10, aortic regurgitation 25, thoracic aneurysm 15. "While his [the negro's] endocardium seems to resist the implantation of other infectious diseases much more than that of the Caucasian, the *Treponema pallidum* finds in his aorta and the aortic valves a favourite nidus." This has been often demonstrated in cases unsuspected of syphilitic infection during life.

It is stated that lesions of the mucous membrane are not nearly so common in negroes as in whites; one of the reasons may be that the "English tropical negro" does not use tobacco as much as the Caucasian.

"Of the 366 cases of syphilis without other coincident diseases 114 showed some elevation of temperature. This amounts to over 31 per cent. Slight temperature was present in 37; intermittent in 36; high continuous in 17; occasional spikes in 14; and remittent in 10 cases. The temperatures due to iodism and mercurialism are carefully excluded from this tabulation." It is noted also that cases that resisted quinine for even as long as five or six days are excluded.

The author only found eight cases of yaws in the period covered by the paper. He writes, "the ease with which any tyro can find the specific treponema in yaws lesions is almost as characteristic as the eruption itself." He found no morphological difference between the two organisms.

Bacteriological and Serological Diagnosis.—The author has found *Treponema pallidum* in the primary lesions in a number of cases. He did not attempt the search often; it was so disappointing and time consuming that it was given up as a practical means of diagnosis. The Wassermann test was made by Dr. BATES. The Noguchi modification was used and was positive in 385 of the total 466 cases, giving a positive result in 82·6 per cent.

The Wassermann Test in 365 Cases of 10 Distinct Groups of Syphilitic Disease.

Group of Cases.	Number examined.	Positive.	Negative.	Percentage positive.
1. Chancre	27	26	1	96·3
2. Arthritis and bursitis	73	70	3	95·9
3. Gummata	17	16	1	94·1
4. Secondary eruption .	43	39	4	90·7
5. Acute periostitis . .	42	36	6	85·7
6. Exostoses	62	47	15	75·8
7. Aneurysms	13	9	4	69·2
8. Cerebrospinal . . .	50	34	16	68·0
9. Aortic disease . . .	32	19	13	59·4
10. Palate destruction..	6	3	3	50·0

The negative test in the first group was undoubtedly taken too early.

Treatment.—The authors were obliged to use intensive treatment as they were unable to retain the patients in hospital for long; the average stay was 20·7 days per man. They used proto-iodide of mercury, potassium iodide and blue ointment. For details the paper must be consulted. In 63 cases salvarsan was used as well as mercury and iodides. The author realises that an actual cure by therapy under these conditions is extremely unlikely. "The infected patients return to the wards periodically for amelioration of their acute symptoms . . . while the relieved ones return to their habitations to perpetuate and increase the disease."

[As may be gathered from the summary this paper is a mine of information.]

A. G. B.

Low (George C.). **An Interesting Case of Syphilitic Pyrexia in an Indian Native. The Value of a Positive Wassermann Reaction in Diagnosis.**—*Trans. Soc. Trop. Med. & Hyg.* 1916. July. Vol. 9. No. 8. pp. 235-241. With 6 charts.

An Indian Lascar was admitted to the Seamen's Hospital for pneumonia on March 14th; the disease progressed favourably and the temperature fell on the 18th. On the evening of April 1st the

temperature rose and thereafter every night, to about 103°, coming down in the morning to subnormal; this continued for over a month. No cause could be found. On May 1st and afterwards a murmur and thrill were perceived over the heart. On May 10th the patient's blood was found to be strongly positive to Wassermann's reaction. He received liq. hydrarg. perchlor. and pot. iod.; the temperature promptly fell and remained normal. It is pointed out that there was no gross lesion indicative of syphilis. It is suggested that the cardiac condition was associated with a syphilitic aortitis. The moral is drawn that in a case of pyrexia of doubtful origin a Wassermann test should never be omitted. The charts illustrate the nature of the pyrexia.

A. G. B.

BAYON (H.). The Treatment of Syphilis in African Native Tribes and among Native Workers on the Rand.—*Trans. Soc. Trop. Med. & Hyg.* 1916. Apr. Vol. 9. No. 6. pp. 187–191. With 1 plate.

After some general observations on syphilis in African natives the author describes the method of treatment at the Rietfontein Lazaretto, eight miles from Johannesburg, for the native workers on the Rand. Treatment is compulsory and 300–400 are always there. Neosalvarsan in concentrated form is used,

“the solution being made with 7 cc. of warm tap water in the tube containing the drug, aspirated into a small syringe, and injected intravenously on the spot. In this fashion, by preparing the veins beforehand, as many as twenty cases an hour can be injected. The injections are followed by inunction every third or fourth day, and, if considered necessary, calomel is injected intramuscularly. The whole course of treatment does not take over seven weeks, as a rule, though some cases may require a longer period before they can be declared free of any symptoms or danger of recurrence.”

Arsenical preparations by themselves have not been found to bring about a lasting cure.

A. G. B.

CARNOT (P.) & de KERDREL. Sur une épidémie de pneumococques observée chez des Annamites.—*Bull. Mém. Soc. Méd. des Hôpit. de Paris.* 1916. June 16. Vol. 32. 3 ser. No. 19–20. pp. 935–947.

— — — **La Pneumococcie épidémique des tropicaux.**—*Paris Méd.* 1916. July 8. Vol. 6. No. 28. pp. 37–43.

The epidemic in question broke out among Annamites, sent to France to work in manufactories, 15–20 days after their disembarkation; they were small and poor subjects not suited for soldiers. They were landed at Marseilles when the mistral was blowing and housed, crowded together and insufficiently clothed, in buildings open to the wind.

In a “considerable proportion of cases” (50 per cent. in some series) typical pneumococci were isolated from the blood. The organism killed mice but not very rapidly, in 24–44 hours. At the beginning the mortality in the men was nearly cent. per cent. Later, when the environment and weather improved, it fell to half and after some weeks still lower.

The disease was studied clinically in more than a hundred cases, of which 18 came to autopsy. In only half the cases was there frank acute lobar pneumonia, and in those there were also diffuse lesions in

the lungs. In the other half there were congestion, acute oedema, broncho-pneumonia, haemorrhagic infarcts in both lungs. The sputa were often colourless or white; in most cases there was also abundant froth, symptomatic of acute oedema of the lung. Pleurisy occurred in half the cases. Pericarditis was very frequent at the beginning of the epidemic. Peritonitis was seen in only four cases. Meningitis occurred three times, suppurative otitis four times. Ecchymoses were seen in several autopsies in the large and small intestine, comparable with those observed in experimental septicaemia of the rabbit.

At autopsy large liver, spleen, and kidneys were almost always found. The spleen could be felt in life 4-5 fingers breadth below the false ribs. It was red and congested; its condition was not due to old malaria, the lesions of which were recognised in some cases. Such a spleen is seen in the experimental infection of mice and rabbits. At the end of the epidemic there were a large number of large subcutaneous or deep abscesses, in which the pneumococcus was found, at the sites of remedial injections.

The authors proceed to discuss this condition of pneumococcic septicaemia, as they call it, and draw attention to the epidemic character, the diffusion and generalisation of the lesions and their gravity. They conclude that pneumococcic infection in exotics from the tropics occupies an intermediate place between the classical lobar pneumonia of France and experimental pneumococcic septicaemia of mice and rabbits. Lastly, they state that they have had interesting results from subcutaneous injections of bile, the pneumococcolytic action of which is known. Details will be published.

A. G. B.

COMMES (Ch.). *Traitement de la pneumonie chez les Tirailleurs Annamites par les injections intra-veineuses d'or colloïdal.*—*Bull. Soc. Path. Exot.* 1916. Apr. Vol. 9. No. 4. pp. 275-282. With 8 charts.

Of all the diseases contracted by the native contingents in France, the author writes, pneumonia is the one most frequently met with. In the Annamite Tirailleurs the symptoms are almost always alarming. Many cases were treated by the usual methods with scant benefit and the author resorted to colloidal gold, which he states has been used with success by Noel BERNARD in the case of the Senegalese Tirailleurs. He uses the "Collobiase DAUSSE" in intravenous injection. There is a violent reaction—sweats, sharp pain, delirium, rise of temperature, but 3-4 hours later there is defervescence (1° - 2°), dyspnoea gets less, the patient expresses himself better and is ready for a second injection. Eight cases are described with charts. All recovered. Three of the patients had double pneumonia.

The author concludes that intravenous injection of colloidal gold should be given as soon as a diagnosis of pneumonia is made, that the dose may be from one to two cc. without any risk, and that it may be repeated daily; as a rule three are enough to bring the temperature down and the lung inflammation to an end.

A. G. B.

EGBERT (J. Hobart). **Epidemic Pneumonia in the Tropics.**—*New York Med. Jl.* 1916. June 10. Vol. 103. No. 24. Whole No. 1958. pp. 1125-1126.

In March, April and May 1913 at the Colombian port of Santa Marta pneumonia occurred in epidemic form in the barracks, occasioning the death of nine, seven and two soldiers in the respective months. Suppuration occurred in several instances; in some the pneumococcus was found in the blood. Santa Marta is sandy, the annual rainfall is very low and the temperature varies from 79° to 92° F. The disease was first reported as plague but inoculations practised on guinea-pigs and rats were negative. The troops were temporarily removed from the town and the barracks were cleaned and disinfected. It is noted that there were "380 soldiers and about 20 officers quartered in a building that could not well afford proper accommodations for more than half that number." Similar epidemics have occurred in the same neighbourhood before and since.

A. G. B.

CLARK (Herbert C.). **Preliminary Notes on Neoplasms found in the Inhabitants of Panama Canal Zone, with Special Reference to their Occurrence in the Negro and Mestizo.**—*Proc. Med. Assoc. Isthmian Canal Zone for the Half Year Oct. 1914 to Mar. 1915.* [1916] Vol. 7. Pt. 2. pp. 65-84.

This paper cannot be dealt with in any detail here. Interested persons must consult the original, in which tables are furnished for carcinoma, epithelioma, sarcoma and endothelioma, and twelve other classes of tumours, the incidence and location in West Indians, Latin Americans (mestizo), North Americans and Europeans being given, with the numbers at each decennium. It is noted that the large majority of the population consists of imported vigorous young male negroes (29,600 out of 70,000 in 1912), chiefly Jamaicans and Barbadians. There are also old negro men who have resided in the Isthmus since the French occupation. Another large group of labourers is made up of Spaniards, Italians, and other Mediterranean peoples. Females form only one-third of the population. Only the material collected at the Ancon Board of Health Laboratory is here analysed. The period of time is from 1906 to January 1915. After presentation of the statistics the views of authorities are given on the incidence of malignant neoplasms in the negro.

The summary is as follows:—

"1. The character of the Canal Zone inhabitants from which the base hospital at Ancon has drawn most of these neoplasms can be fairly well represented for the period of time under discussion, by the Canal Zone census taken in 1912. It is chiefly composed of young robust negro males.

"2. When one considers the number of malignant neoplasms found in the negroes of this series and recalls the number in the clinical records that have escaped the pathologist, it would seem fair to say that the negro under discussion has revealed a higher rate of such findings than is generally credited his race elsewhere.

"3. Malignant neoplasms have occurred in larger numbers in the earlier decades of life than is recorded elsewhere.

"The principal cause for this, perhaps, is the great preponderance of young adult people and, perhaps, the fact that sexual maturity occurs earlier here among these races than in a temperate zone. This may lay the groundwork of neoplasms of the genital and mammary systems.

" 4. Gland carcinoma has been met with rather frequently in the negro race selecting as a rule the following organs in the order named : Stomach, breast, uterus, and the biliary systems.

" 5. Cancer originating in epithelial structures revealed a striking incidence on the penis and cervix and in the esophagus.

" A number of instances are recorded showing occurrences about the face and mouth although by no means to the extent that would probably have occurred in a large white population.

" 6. Sarcoma, in spite of the enormous number of young black adults, did not occur as often as good opinions would have led one to suspect.

" 7. Neoplasms arising from the endothelium are occasionally seen, as are also the mixed tumors.

" 8. Dermoid and teratoid tumors show a tendency to select the negroes in this series.

" 9. Tumors of the nervous system are not very common.

" 10. The prevalence of keloids and other fibroid tendencies as noted by the clinicians during this period confirm the traditional record in regard to the negro and mixed race but the pathological records contain but few good keloid specimens such as are frequently shown in the primitive African.

" 11. The negro and mestizo of this series has very seldom revealed cystic degeneration or a new growth in the thyroid gland."

In the discussion Dr. DARLING remarked that neoplasms are included in all forms of life and will be found even in protozoa. He has made a collection of entamoebae which, he believes, illustrates this.

A. G. B.

WEILL (E.) & MOURIQUAND (G.). *Les maladies par carence. Carence expérimentale. Carence clinique.*—*Rev. de Méd.* 1916. Jan. Vol. 35. No. 1. pp. 1-71. With 5 figs. & 24 charts; Feb. No. 2. pp. 73-107.

This memoir traverses some well-known ground but is decidedly worth perusal. It includes the matter of a considerable number of short papers which the authors have written in the last two-three years. The observations, experiments, and arguments are clearly and logically set forth. References to previous work are not many—EIJKMANN, FRASER and STANTON, HOLST and FROELICH, FUNK, COOPER, SUZUKI, etc., but BRADDON is not mentioned.

The authors deal first with experimental deficiency (the word *carence*, from *carere*—to lack, is used to designate a food deprived of certain of its elements as well as the disease produced by the ingestion of such food); then with clinical deficiency. Under the first head they consider—(a) food deficiency disease in the pigeon caused by decortication or by sterilisation of cereals or pulses; (b) food deficiency disease in mammals (cats and rabbits); beriberi and scurvy; (c) growth and the "ferment" substances; (d) how these substances act on nutrition; (e) inanition and one-sided diets. They claim, as their contribution, to have shown the antiberiberic power of the cuticle of cereals other than rice and that of pulses as well as of fresh vegetables, fruits, and fresh meat, and the effect of sterilisation of undecorticated cereals, etc., sterilisation on the top of decortication producing "*hypercarence*" [this *Bulletin*, Vol. 7, p. 377]. They think that the action of the "ferment" substances is not direct but through the ductless glands which they "activate"; they note the part taken by the pituitary gland in the metabolism of carbohydrates. They confirm

the results of other observers who have found that when vitamins are lacking an excess of carbohydrate food hastens the onset of symptoms.

The second part of the monograph deals with (a) deficiency disease in the child; milk, flour; (b) deficiency disease in the adult; the feeding of armies; fresh food in the nutrition of the soldier; war bread. Under this last head they state that, owing to the poor wheat harvest in France in 1915, MAUREL recommended for bread making the addition of 10 per cent. of pure rice flour to wheat flour, such addition not lessening appreciably the nutritive properties of the bread. The authors note that beriberi may follow a diet of which decorticated rice forms only a part and cite the diet which FRASER and STANTON gave to coolies and which produced beriberi in them. In conclusion they state that "life being necessary to life, in a rational dietary one must have the maximum that is digestible and utilisable of fresh and living food." The last 34 pages contain the protocols of 97 experiments.

A. G. B.

LEVY (William V.). **Scarlet Fever on the Canal Zone.**—*Proc. Med. Assoc. Isthmian Canal Zone for the Half Year Oct. 1914 to Mar. 1915.* [1916.] Vol. 7. Pt. 2. pp. 25-30.

The author notes that the relative frequency of the "acute infectious contagious diseases" on the Isthmus is shown by the annual reports of the Chief Sanitary Officer for the years 1907 to 1913 to be as follows: Measles, 322 cases; mumps, 183; chickenpox, 34; scarlet fever, 8. The clinical manifestations of the three first named are so typical that there is seldom any delay in making a diagnosis. The author has found in the files of the Ancon Hospital the charts of 22 cases diagnosed as scarlet fever. Many of these occurred in people just arrived by ship, but ten cases originated on the Isthmus, having occurred in individuals who had resided there from 18 months to their lifetime. There follows an account of the symptoms of these ten cases. Four were children and six adults; six were white, the others were Panamanians or Jamaicans, "probably of the lighter hued class." Complications were: arthritis (3), otitis (1), cervical phlegmon (1). A brief description is given of one case.

McCOLLUM is quoted to the effect that in the Western Hemisphere a zone of comparative immunity to scarlet fever extends from the Equator to 10° N. latitude; but that in times of pandemics occasional epidemics occur at points in the zones of comparative immunity, the Caucasian race being affected by preference. These outbreaks are accounted for by the arrival of ships having the infection on board. The disease fails to become acclimatized and dies out completely. The author agrees with McCOLLUM. The cases encountered are generally mild, persons attacked are usually whites, and the disease does not spread. It is to be remembered, however, that the exanthem constitutes the chief factor of the diagnosis and its recognition in the negro is at times very difficult. Both measles and mumps have become endemic in the Isthmus and at the time of writing these diseases were epidemic.

The author notes that "the belief is gaining that the scales are really innocuous, that the disease is contagious before desquamation has begun and after it is completed, and that the discharges from the nose, throat and ears are the agents of transmission." At Ancon measles, mumps, scarlet fever, and diphtheria are treated in the same ward, "somewhat isolated." There has been no case of secondary infection except one—a mumps patient who contracted measles.

A. G. B.

SCOTT (G. Waugh). **A Case of Acute Rheumatism occurring in the Tropics, with Notes on the Heart** by Harold T. Skae, M.D.—*Lancet*. 1916. Jan. 15. pp. 132-133.

The author, who writes from Perak, F.M.S., refers to CLARKE'S paper on the geographical factor in rheumatic fever [see this *Bulletin*, Vol. 6, p. 429]. The case here recorded is given in considerable detail; the following are excerpts:—

"A Tamil boy, aged 10 years, was admitted to Kamuning Estate Hospital on June 28th, 1915, complaining of acute pain and swelling of both ankle-joints. . . . The heart impulse was very diffuse and produced a wavy motion, easily visible over the cardiac region. The apex beat was situated half an inch below and one inch outside the nipple line. On auscultation there was present a loud blowing systolic murmur. . . . On admission the temperature was 100° F. . . . Repeated blood examination gave negative results. No evidence of intestinal parasites was found on examining the faeces, either macro- or microscopically. . . . On the second day the temperature remitted, but rose again to 100° on the third day, and thereafter for three weeks it fluctuated, varying as to the first ten days between 99° and 101°, and afterwards from 98° to 100°. On the third day the case was seen and examined by Dr. McLean, who confirmed the presence of a very definite pericardial friction sound. . . . On the morning of the fifth day the left knee became swollen and painful. The pain in the left ankle had by this time subsided. By the tenth day the right knee had become very much swollen and was very painful. . . . Mr. Clarke saw the patient on the tenth day, but did not agree with the diagnosis on account of the absence of excessive sweating and anaemia. The presence or absence of sweating before this day had not been noted, but from then onward sweating was a marked feature."

On the 18th day and on three later occasions Dr. Skae reported on the heart condition. Pericardial friction is noted again on July 27th. The cardiac condition was found "indicative of some degree of endocarditis of the mitral valve. . . . There can be little doubt that the cause of the cardiac lesions was acute rheumatism."

There was no evidence of gonorrhoea. General pyaemia, rheumatoid arthritis, tuberculosis, and hereditary syphilis are discussed and put out of court. The author cannot see how this disease can be regarded as anything else than acute rheumatism.

A. G. B.

ISMAIL (Abd-el-Aziz). **Hysterical Anaesthesia in Egyptians.**—*Practitioner*. 1916. Feb. Vol. 96. No. 2. [No. 572]. pp. 218-220.

The author, who is Resident Medical Officer at the Kasr-el-Ainy Hospital, Cairo, has in the last three years seen 60 cases of hysteria, chiefly as hospital out-patients. He says it is far more common in the Sudanese than in the Egyptians [in which case the title is unfortunate]. Hysterical fits are often observed, chiefly of the hysteroid type

(Gowers). Of the hysterical stigmata aphonia and anaesthesia are the commonest. Anaesthesia of the epigastric region is present in the majority of cases so that the author looks for it whenever hysteria is suspected; it is accompanied by a sense of obstruction in the throat. The epigastric region is tender and within a certain region the patient does not feel either touch or pain. The author suggests two causes for the anaesthesia of the epigastrium: (1) the idea still present in the public mind that the heart is the seat of the emotions and the belief that it lies in the epigastrium; (2) pain in the epigastrium is the commonest complaint among the out-patients and this symptom is caught by the hysteric. A smaller number of patients had local anaesthesia other than epigastric; this was accompanied by motor phenomena. Thus paralysis in one arm is invariably accompanied by anaesthesia of the part, aphonia by anaesthesia of the tongue, etc. This constant association is attributed to the idea that sensory changes must accompany motor disorders. The sight of the numerous lepers of Egypt with loss of sensation must often furnish a symptom for the neurotic. Anaesthesia unaccompanied by motor phenomena was met with only in two cases.

A. G. B.

CARINI (A.). **Un cas de Blastomycose péritonéale à *Coccidioides immitis*.**—*Bull. Soc. Path. Exot.* 1915. Vol. 8. No. 10. pp. 712-715. With 1 plate.

The author notes that the first reports on blastomycosis in Brazil were published in 1908 (LUTZ, CARINI) and that several similar cases have been since observed, about 40 in all. The initial lesion in each case was on the skin or the mucosa of the mouth, nose or throat. Secondary localisations in the viscera have been seen in many people and proved at autopsies. In the present case there was no lesion on the skin or mucosa; the disease appears to have attacked the viscera directly.

The case was that of a man of 21 who lived in the state of Sao Paulo. His illness began with vomiting, malaise, fever, and pains in the right iliac fossa. Appendicitis was diagnosed and the patient consulted Dr. SENG at Sao Paulo. This surgeon found a swelling of the size of a goose's egg in the right iliac fossa; the lungs, liver and spleen appeared to be normal; there was no enlargement of the lymphatic glands. The abdomen was opened and it was found that the ascending colon was fixed to the pelvis by a tumour which had invaded the retroperitoneal lymphatic glands. It was not possible to extirpate this tumour so a piece of one of the glands was removed. This was examined microscopically and was found to contain numerous giant cells, such as those figured, in the interior of which there were parasites, round bodies 5 to 25 μ in diameter with a double contour. Many were multiplying by sporulation. A diagnosis of blastomycosis was therefore made and iodide of sodium prescribed, but this does not appear to have been of much benefit.

The author has only found one similar case in medical literature, observed in France by BLANCHARD, SCHWARTZ and BINOT; the parasite was a *Saccharomyces*. He has however learned of similar cases in Brazil in one of which the parasite was *Coccidioides immitis*;

in this an amoebic ulcer appears to have been the point of entry (HABERFELD). This form of the disease is difficult to diagnose owing to its resemblance to tuberculosis and malignant tumours.

A. G. B.

HARMER (Sidney F.). On a Leech removed from the Nasal Cavity of a Soldier from the Dardanelles.—*Jl. Roy. Nav. Med. Serv.* 1916. Jan. Vol. 2. No. 1. pp. 34-35.

The author notes that the warmer countries round the Mediterranean are inhabited by a species of leech, *Limnatis nilotica*, which has a habit of effecting entrance into the nasal cavities, pharynx and larynx of man, horses and other animals. The army of Napoleon returning from Syria to Egypt suffered severely. The patient in this case was admitted to the Beach Hospital at Gallipoli on August 21st for shrapnel wounds. On the 23rd he began to suffer from nose bleeding, headache and pains in the stomach. The case was presumably diagnosed as enteric. He was transferred to a hospital ship, and on September 10th arrived at the Military Hospital, Tooting, still suffering from the above symptoms. Three days later a leech was observed and extracted from his nose by the nurse. It proved to be *Limnatis nilotica* and, after preservation in spirit, measured $3\frac{1}{2}$ inches in length and half an inch in thickness. The author gives a summary of our knowledge of hirudiniasis. The leech usually attaches itself near the posterior nares behind the soft palate.

This species of leech is an inhabitant of fresh water and is extremely common, in certain districts, in pools and wells. It is believed to be taken in when drinking, especially at dusk, and is stated to be ordinarily not thicker than a horse hair. Its bite produces copious bleeding. It may be removed by saturating a piece of cotton wool with a 30 per cent. solution of cocaine and bringing it in contact with the parasite; it is well to place the patient on a bed with his head hanging over the edge so that the leech may not pass down the trachea. In districts where leeches are common drinking water should be strained through fine muslin or boiled. Similar precautions must be taken to protect horses and mules:

A. G. B.

Low (George C.). An Interesting Case of Eosinophilia.—*Trans. Soc. Trop. Med. & Hyg.* 1916. Jan. Vol. 9. No. 3. pp. 77-81.

The patient was from India; apart from many pigmented moles and "linear pigmented marks" on the skin he was organically sound. The differential count was as follows:—

	No. counted.	Per cent.	No. per c.mm.
Polymorphonuclear.. ..	118	23.6	2,454.4
Large Mononuclear.. ..	13	2.6	270.4
Lymphocytes	121	24.2	2,516.8
Eosinophiles	244	48.8	5,075.2
Transitional	3	.6	62.4
Mast Cells	1	.2	20.8
	500	100.0	10,400.0

He had therefore an absolute and relative increase of eosinophiles of a very high degree. The eosinophilia had been already detected in India, and no cause found. No parasites could be found in the blood or faeces. Filariasis, hydatids, guinea-worm and trichinosis were considered; the last was a possibility. The pigmented warts he had had from childhood.

Dr. WENYON has recorded a case from the Sudan in which the eosinophiles reached 70 per cent.; here there was a chronic skin eruption taking the form of localised thickenings with much irritation.

The author finds that "a certain moderate degree of eosinophilia" is not an uncommon occurrence in the blood of patients from the tropics not suffering from any definite disease. He himself once had a case in which the eosinophiles were always between 14 and 20 per cent.; it came to autopsy and no cause could be found. Details of the case from India are appended.

A. G. B.

BOOK REVIEWS.

NILES (George M.), [M.D.]. **Pellagra. An American Problem.**—261 pp. Demy 8vo. 2nd Edition. Illustrated. 1916. Philadelphia and London: W. B. Saunders Co. [Price, Cloth \$3.00 net.]

To the physician interested in Pellagra the second edition of Dr. Niles's work should prove both interesting and valuable. After a detailed and critical survey of the general history of pellagra, the author proceeds to describe its appearance and incidence in America where it has of late made rapid progress. While the disease is treated on general lines as a wide spread malady occurring in almost all countries, the chief purpose of the present volume is to deal with pellagra as seen in America, and to endeavour to contribute something to our knowledge of what has recently become, for America, a very serious problem. The vexed question of the etiology of pellagra is discussed from various points of view and a fair and broad-minded attitude assumed towards the many theories that have from time to time been advanced to explain the causation of this dread disease. The results of the recent work of Dr. GOLDBERGER, special U.S. agent for the study of Pellagra and the reports of the Thompson-MacFadden Pellagra Commission are included. On the whole, the author takes the view that pellagra is not a parasitic disease and rejects SAMBON's claims regarding the part played in its etiology by the *Simulium reptans*. He is inclined to accept a modification of LOMBROSO's dictum that "in pellagra we are dealing with an intoxication produced by poisons developed in spoiled maize through the action of certain micro-organisms in themselves harmless to man." For the words "spoiled maize" Dr. Niles would substitute "spoiled carbohydrates" and this amplification appears to him sufficient to cover the etiology of pellagra in the light of our present knowledge.

It is questionable whether this view of Dr. Niles will receive general acceptance. Modern research work raises doubts as to the necessary connection of spoiled maize or carbohydrates with pellagra. The old idea that the nutritive value of any particular food could be indicated in terms of its content of protein, fat and carbohydrate has recently been exploded, and with it we must cast aside many of the assertions made by the older writers who stated that unspoiled maize was a perfect food. Such statements were based chiefly on the results of chemical analyses which we now know are insufficient to indicate whether or not a given substance contains all the essentials necessary for life. Since this defective method of investigation appeared to prove that such a substance as maize was a perfect food, it was but natural to conclude that, in order to cause pellagra, the maize must be spoiled. This, no doubt, helped to perpetuate the idea that pellagra originated as the result of spoiled food. After all, the connection of maize or carbohydrates (spoiled or unspoiled) with pellagra may be more or less accidental, and the results of recent research undoubtedly point to the probability that pellagra is a disease brought about by the absence from the diet of certain essential constituents. No doubt, there are still many apparent objections to this view, but similar difficulties were manifest in the case of beriberi; in this disease, for instance, many observations pointed strongly to its apparently infectious nature, and yet to-day nobody doubts that beriberi is a manifestation of the lack of certain essential substances in the diet. If spoiled food plays any part in the etiology of pellagra, it is more likely that this is due to a destruction of certain constituents, rather than to the production of toxic substances. The whole question is, however, still obscure and at present permits of no dogmatic observations.

One of the most useful chapters in the book is taken up with a description of the symptomatology and clinical course of pellagra. The author justly points out that here we have a disease, whose symptoms and clinical history present a panorama more varied than is perhaps encountered in any other morbid condition. These varied manifestations often render the diagnosis difficult or uncertain, and useful hints from the author's clinical experience are given which should prove of value in dealing with obscure cases. The typical symptoms of pellagra are described under the

three usual headings—gastric disturbances, skin lesions and nervous phenomena—symptoms which appear to be present to some extent in every case though there does not appear to be any well defined order of occurrence. Emphasis is laid on the fact that the course of the disease and the exact form which the symptoms take are dependent on such factors as age, race, occupation, previous state of health, environment and a host of other modifying conditions; these points must all be carefully considered in estimating the true nature of the malady and here Dr. Niles furnishes useful help. A number of good photographic reproductions of the different skin lesions encountered in the disease are given, which of themselves materially enhance the value of the book for diagnostic purposes. Complications and prognosis are also discussed. After surveying the general symptomatology and clinical history of the disease the author adopts the useful measure of devoting a short chapter to a description of the clinical histories of actual cases taken from widely scattered localities. By this means it is hoped that the reader may obtain a broader conception of the “disease entity” than would otherwise be the case. A short chapter is devoted to pathology and morbid anatomy. As might be expected in a condition presenting so many manifestations, the pathological lesions are by no means constant. Treatment receives a good deal of attention and the general methods adopted—hygienic, dietetic and medicinal—are clearly indicated while a chapter of 18 pages is devoted to a discussion of prophylaxis. In the present state of our knowledge, treatment is necessarily based on more or less general lines, but the clinician will find here all the principal modern ideas and methods at present in vogue. The book ends with a chapter describing some recent experiments on animals and deductions therefrom.

On the whole, Dr. Niles has succeeded in presenting a very readable volume which, though dealing specially with pellagra as seen in America, cannot fail to be of much value and assistance to all medical men interested in the disease. At the present time, when isolated cases of pellagra are from time to time being diagnosed in places where its presence was hitherto unsuspected, the present work should be of much service.

H. Maclean.

HERMS (William B.). Medical and Veterinary Entomology. A Text-book for Use in Schools and Colleges as well as a Handbook for the Use of Physicians, Veterinarians and Public Health Officials.—xii + 393 pp. 8vo. With 228 figs. 1915. New York: The Macmillan Co. [Price 17s. net.]

This is essentially a practical book, not burdened with much descriptive or morphological or taxonomic detail, but greatly focussing attention upon life-history and pathogenic activities, and thoroughly examining specific methods of keeping noxious insects at arm's length—the technique of “insect control.”

The first five chapters deal briefly with matters of general interest, such as the pathological and sanitary significance of insects, the scope and lie of preventive measures, the broad outlines of classification, the modes and conditions in which insects figure as infective agents, and also with some simple features of those portions of the insect-anatomy—the digestive tract, the salivary glands, and the mouth-parts—which are most concerned in the manipulation and transmission of the morbid material.

The next twelve chapters deal with insects of admitted or suspected pathogenic importance, grouped according to practical convenience; then follow two chapters on ticks and mites, and last of all a chapter on the Arthropoda which are primarily obnoxious by their venomous secretions.

Of the chapters dealing with insects that provoke or disseminate disease the fullest are the two allotted to the common house-fly; all the relevant biological facts are clearly set forth, the contaminative proclivities and the specific infective powers of the insect are recounted at full length, and the methods of controlling and preventing the fly-peril are described and discussed very thoroughly. In the front of all methods the author sets

popular instruction. Another good chapter is that on Myiasis, in which all the maggots that find any sort of footing in the inward parts of man and domestic animals, whether as true parasites or by accidental lodgment, are reviewed in a comprehensive and thoroughly practical fashion, though the maggot of *Apiochaeta ferruginea*, which seems to be a very persistent parasite of the human intestine, is not included in the list, and no reference is made to the manner in which the eggs of *Dermatobia* are said to be transported by specific mosquitoes.

There are three chapters on mosquitoes, of which that on mosquito control is excellent, all essential and reasonable measures being described and critically estimated. The author pillories the honest word "*larvicide*," substituting for it the strange compound "*larvaecide*." But the former word is, as Bardolph said of "accommodate," a word of exceeding good command, being formed, as all the world knows, in strict accordance with etymological rule, and on the classical analogy of *tubicen* from *tuba*, *pennifer* from *penna*, *laniger* from *lana*, *libripens* from *libra*, etc. The natural history of mosquitoes is something sketchy, and the classification is a very perfunctory piece of work. The inclusion of verruga, along with figures and a brief account of *Phlebotomus*, in the chapter headed "Mosquitoes as Disease-Bearers" is not a little puzzling.

The chapter on blood-sucking Muscids contains a good account of *Stomoxys* and its problematic relations to disease, and also pays sufficient attention to *Haematobia*; but of the genera foreign to America *Glossina* alone receives notice, and that somewhat scant.

The other component chapters on Cockroaches and Beetles, on Lice, on Bed-bugs and Reduviidae, on Simuliidae and Tabanidae, and on Fleas and Hippoboscidae, contain much useful information as to habits and life-history, general economic and pathogenic importance, exact connexion with specific disease, hurtfulness *in posse*, and methods of destruction and prevention.

The most noteworthy features of the chapter on ticks are the full exposition of the methods of exterminating and circumventing these dangerous creatures, and the detailed accounts of four notorious species, *Boophilus annulatus*, *Dermacentor venustus*, *Argas persicus*, and *Ornithodoros moubata*, and the specific diseases for which each is responsible.

The book is liberally illustrated, and the figures though unpretentious are clear and characteristic, with very few exceptions; the most amicable reviewer has not heart to bear with No. 108 (larva of *Simulium*) in its dissipated defiant attitude to nature, and No. 138 (mouth-parts of a tsetse-fly).

It is to be noted that *Cyclops* in its association with guinea-worm is not comprehended in the book, but probably the omission is intentional, although the fathers of Entomology included Crustacea in their province.

Taking the work as a whole, although it does not profess to be a comprehensive treatise, and although so far as its purely entomological framework goes it has some geographical limitations which perhaps carry it short of all the requirements of medical men whose interests lie outside the zoological regions of the New World, yet in respect of all general principles and particularly of those that underlie prevention and control, it will be found universally useful.

A. Alcock.

DONALDSON (Henry H.). The Rat. Reference Tables and Data for the Albino Rat (*Mus norvegicus albinus*) and the Norway Rat (*Mus norvegicus*).—Memoirs of the Wistar Institute of Anatomy & Biology. No. 6. v + 278 pp. With 31 charts. 1915. Philadelphia. [Price \$3.]

The scope of this book may be indicated by an extract from the preface. The author writes:—

"An introduction treats of the rat as a laboratory animal, indicates the methods of gathering the data, and also gives examples of our use of the tables. This is followed by an outline of the classification of the common

rats and by a brief statement of the history of the rat since it arrived in western Europe.

"The rest of the book falls into two parts. The first part deals with the domesticated albino rat—concerning which we have the larger amount of information.

"The second part deals in a similar way with the wild Norway rat—the form from which the Albino has been derived. In connection with each part the several reference tables and the formulas employed for them and for the corresponding graphs are given, and at the end of the book a list of papers on the rat is added. . . . It is hardly necessary to add that in most directions our information is fragmentary."

The value of such a book in the laboratory is obvious. Of general interest is the section on early records and migrations of the common rats. *Mus rattus*, the house rat (which is not dealt with in this book), is probably indigenous to India; the variety *alexandrinus* is now more frequent in warm latitudes. The house rat entered Western Europe in appreciable numbers after the twelfth century or earlier. The Norway rat did not reach Western Europe till 1727–1730, so that the European rat of the middle ages (of Pied Piper fame and of the great plagues) was *Mus rattus*; *M. rattus* was brought to South America early in the sixteenth century. The Norway rat, following the house rat after six hundred years, has become dominant in Western Europe and the northern United States, by reason of its pugnaciousness and, probably, the progressive disuse of wood as a building material. The common albino rat is a variety of the Norway rat; its place and time of origin is uncertain.

A. G. B.

TROPICAL DISEASES BUREAU.

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[No. 7.]

KALA AZAR.

CORNWALL (J. W.) & LAFRENAIS (H. M.). **A Contribution to the Study of Kala-Azar. (1).**—*Indian Jl. Med. Res.* 1916. Apr. Vol. 3. No. 4. pp. 689-724. With 3 plates.

The article is divided into nine sections as follows :—

- " 1. The culture of the peripheral blood as a means of diagnosis.
- " 2. Experiments with cultures of *Leishmania donovani*.
- " 3. The vaccine treatment of kala-azar.
- " 4. The effect of different substances on *Leishmania donovani* flagellates.
- " 5. Animal experiments with flagellate cultures; inoculation and feeding.
- " 6. A method of feeding *Cimex rotundatus* artificially.
- " 7. What happens to *Leishmania donovani* flagellates in the stomach of the bug.
- " 8. Can the bug transmit the infection of kala-azar.
- " 9. Summary."

1. The peripheral blood of seven cases was successfully cultured. The duration of the disease in months was 6, 1, 3, 3, 2, 2, 4. In one case the peripheral blood had shown nothing though the clinical diagnosis was beyond doubt. In another case the peripheral blood had shown nothing and the clinical diagnosis was uncertain.

"The method followed was to take a dozen or so Novy-MacNeal-Nicolle culture tubes to the bedside, to draw off a few cubic centimetres of blood from a vein in the patient's arm, and to distribute the blood among the culture tubes. In the two Coonoor cases the tubes were brought straight back to the laboratory and stored in the dark room at the air temperature 20°-23° C.

"In the Madras cases the tubes were packed in a box containing some ice to keep the temperature in the neighbourhood of 22° C, and brought up to Coonoor.

"A few tubes remained sterile, but in the majority flagellates grew freely. In one case six out of eight tubes gave good cultures and in another all the eight tubes inoculated gave cultures."

2. The following experiments were made :—

"(a) The condensation fluid of N.N.N. tubes containing cultures of the flagellates was centrifugalized and the deposit, after washing in 0.85 per cent. NaCl to free it from any trace of rabbit serum, was dried without heat and ground in an agate mortar. It was then emulsified in a small quantity of 0.85 per cent. NaCl and mixed in varying proportions with washed human erythrocytes. No lysis or agglutination was observed after three hours' incubation at 37° C.

(C310) Wt.P137/63. 1,850. 11.16. B. & F.Ltd. Gp.11/4.

"(b) Further quantities of the flagellate extract were mixed with whole human blood to test its influence on the coagulation time, and it was found to be quite inert in this respect.

"(c) Very careful experiments were made with a strong extract of flagellates and the serum of a kala-azar patient to see if deviation of complement could be demonstrated, but without success; so it must be concluded that specific antibodies are not present in the blood of a well marked case of kala-azar.

"(d) A watery extract of dried flagellates had no proteolytic action on coagulated white of egg at either 38° C. or 55° C.

"(e) Flagellate extract injected into rabbits either subcutaneously or intravenously has no irritant or toxic action whatever."

It is concluded from these experiments that (assuming the flagellate form to have the same properties as the Leishman-Donovan body) the parasite influences body metabolism and causes death purely by cell destruction, as is the case in rabies.

3. Of two cases in which vaccine treatment was tried one died, and the other, after seeming to improve, was lost sight of.

4. "Fresh vertebrate serum is generally fatal to *L. donovani* flagellates within a few hours but they may survive 24 hours or more. Heated serum is less inimical. The flagellates can survive and multiply for over 48 hours in the latex of certain *Euphorbias*. Media prepared with rabbit blood are the only ones that can be relied on, either to procure cultures from the peripheral blood of a kala-azar patient, or to carry on subcultures of the flagellates."

5. *L. donovani* flagellates do not penetrate the epithelial cells of the rabbit's stomach when mixed with scrapings of the mucous membrane.

Nine local garden Lacertidae and eight house geckos from Madras were inoculated intraperitoneally or subcutaneously or fed with flagellate cultures: negative result.

One monkey and one white rat, inoculated subcutaneously: negative result. Two monkeys and four white rats inoculated in left testicle: negative result. One white rat was infected by an intraperitoneal injection of flagellates. One white rat was fed on bread soaked in flagellate culture 23 days old, on 2nd August flagellates developed in N.N.N. tubes inoculated from its heart blood on 25th September. Bugs were fed on this rat on 5th October but none became infected. The rat was killed the same day. Smears from its organs and further cultures proved to be negative.

6. It was found that bugs will feed on citrated blood through a membrane of rabbit skin [cf. this *Bulletin*, Vol. I, p. 124.]. The apparatus consists of a glass cylinder about 6 cm. in length, cut from the upper end of a test tube about 1.5 cm. in diameter. A piece of skin from the abdomen of a rabbit is tied over the flanged end with thread. This cylinder contains the citrated blood. The bug to be fed is placed in a test tube of rather larger size, containing a roll of filter paper cut level at the top and with a V-shaped notch through which its movements can be watched. The level edge of the filter paper is drawn up to the mouth of this tube and the smaller tube containing the feed is placed in contact with it and fixed in position with strips of plasticine.

Strict aseptic precautions must be observed throughout, or bacteria may be ingested and the experiment spoilt. The bug's stomach apparently never normally contains bacteria.

7. *L. donovani* flagellates can survive at least 29 days in the stomach of the bug.

The following remarks are made in connection with a hitherto undescribed phase of the parasite in the bug's stomach. For full details and illustrations, the original paper must be consulted :—

"A most peculiar and striking object appeared in a certain number of the fresh preparations of the contents of the stomachs of infected bugs. It was observed after feeds on both citrated rabbit blood and citrated human blood mixed with flagellate cultures, as early as the third day after the feed and as late as the 23rd day after. It was never seen in bugs uninfected with flagellates, and it never appears in N.N.N. culture tubes. . . .

"The usual form of this object, which we may allude to as a 'thick-tailed flagellate' or, more shortly, as a 'thick-tail' until its nature has been determined, is easily visible with the power employed for fresh preparations (Zeiss 4 mm. apochromatic with No. 6 compensating ocular). It is a roundish body, about 5 or 6 microns in diameter, furnished with a long flagellum, four or five times as thick as the flagellum of an ordinary flagellate, which undulates rapidly. The body is colourless and non-granular and has a double outline. Whether the thick-tail exists as such in the bug's stomach or is only formed after the preparation has been made, has not yet been decided; but, as fully developed thick-tails have been seen within a few seconds of focussing the slide, and as the time occupied in teasing the stomach and making ready the preparation is not in excess of three minutes, it seems probable that its formation is not due to removal of the stomach contents from the bug but that it pre-existed in the bug."

8. Series of bugs fed on citrated rabbit blood plus flagellate culture, and on citrated human blood plus flagellate culture, were allowed to feed after varying intervals on citrated rabbit and on citrated human blood through a rabbit skin membrane, tubes of N.N.N. medium being then inoculated from the second feeds. No growth took place in the N.N.N. tubes though many of the bugs were proved to be still infected. The conclusion arrived at is that the bug cannot transmit flagellates in the act of feeding, even though they are present in its stomach.

E. J. Wyler.

ARAVANDINOS (Anast.). Modification dans la technique de la ponction de la rate.—*Bull. Soc. Path. Exot.* 1916. July. Vol. 9. No. 7. pp. 444-448.

The author claims that by his modifications in technique spleen puncture is rendered practically safe. They are as follows :—

1. A piece of rubber tubing, which must not be too thin or collapsible, is interposed between the needle and the syringe. By this device the needle is able to follow the respiratory movement of the spleen while the piston is rising. As ordinarily used the rigid attachment of the needle to the syringe restrains its movement and tends to lacerate the spleen tissue, an effect which is accentuated by movements communicated to the needle by the hands of the operator as he withdraws the piston.

A steel needle of not too fine a bore should be used.

2. The withdrawal of the piston is rendered automatic by fitting a spring round the piston-rod (which for this purpose is lengthened) outside the barrel between the top of the latter and the handle. A Record syringe of 2 cm. capacity is used. The spring is held compressed by a lever extending along the side of the barrel to its lower

end and is released at the moment the needle has been inserted to the required depth. As soon as the spring is released the needle is withdrawn. The piston should be lubricated with sterilized vaseline to ensure easy working.

By thus causing the piston to rise automatically the speed of the operation is appreciably increased.

The author emphasizes the fact that speed is essential for the avoidance of danger and advises that the operator be content with the amount of splenic juice drawn into the needle, and do not wait for it to enter the barrel of the syringe.

E. J. W.

WARD (Gordon R.). **Kala-Azar in Soldiers returning from Malta.**—*Lancet*. 1916. July 1. pp. 16-17.

The object of this paper is to draw the attention of general practitioners inexperienced in tropical medicine, many of whom are now treating returned troops, to the possibility of kala azar in the presence of splenomegaly in soldiers who have been abroad. Two cases are mentioned in both of which the parasite was found on spleen puncture. Neither patient had ever been further east than Malta.

E. J. W.

RAI U. N. BRAHMACHARI BAHADUR. **Third Report on the Treatment of Kala-Azar with Special Reference to the Use of Antimony and Formaldehyde.**—*Indian Med. Gaz.* 1916. May. Vol. 51. No. 5. pp. 173-178. With 4 charts.

For the previous two papers see this *Bulletin*, Vol. 8, p. 5. The paper now under review is divided into four parts as follows:—

1. Cases treated with metallic antimony.

(a) colloidal metallic antimony.

(b) in a state of fine subdivision as an impalpable powder.

2. Cases treated with compounds of antimony.

3. Cases treated with intravenous injections of antiseptics: formaldehyde and eusol.

4. Alkaloidal therapy.

1 (a). Two cases are described in both of which the results were encouraging. Dosage was as follows:—

In the first case four intramuscular injections of 0.001 gm. were given on successive days and nineteen intravenous injections of 0.002 gm. on the next successive days. A twentieth injection was given eight days after the nineteenth injection.

In the second case fifteen injections of 0.002 gm. and five injections of 0.003 gm. were given intravenously.

(b) Four new cases are described. As in the seven cases recorded in the previous reports, the treatment was followed by marked improvement. The number of injections given were, in one case 7, in one case 3, and in the remaining two 4.

2. A number of further cases are described which were benefited by treatment with intravenous injections of tartar emetic and antimonyl sodium tartrate. Comparing the effects of these salts with metallic antimony it is remarked that in the case of the latter, fewer injections (3 or 4) are required to produce a beneficial effect, whilst it is quicker

in its action and toxic symptoms are less marked. Contrasting colloidal metallic with metallic antimony it is pointed out that the former is given in very small doses and that as it may be injected in 2 cc. suspension it is very convenient to use. It is followed by no unpleasant symptoms.

3. *Formaldehyde*. Two further cases are described (making three in all), in which intravenous injections of this drug were followed by great improvement. In the first case dosage was as follows:—

18 cc.	of	1/4000	solution	on	the	1st	day.
36	"	"	1/4000	"	"	"	2nd "
35	"	"	1/3000	"	"	"	3rd "
36	"	"	1/3000	"	"	"	5th "
34	"	"	1/2000	"	"	"	10th "

Formaldehyde is unstable and hence different samples vary in strength. The author is experimenting with formaldehyde sodium disulphite, which is more stable and is obtainable in crystalline form.

Eusol, prepared after LORRAIN SMITH'S formula. A single case was treated with the result that as far as the blood picture was concerned there was slight improvement. The size of the spleen however was unchanged. The doses varied from 55 cc. to 200 cc. given intravenously on successive days.

4. Intravenous injections of quinine bihydrochloride, narcotine, berberene sulphate and bebeerene sulphate were tried. The results were not encouraging.

E. J. W.

da MATTA (Alfr.). *Sur les leishmanioses tégumentaires. Classification générale des leishmanioses.*—*Bull. Soc. Path. Exot.* 1916. July. Vol. 9. No. 7. pp. 494–503. With 2 plates.

This paper is concerned with dermal leishmaniasis in South America, especially as it is found in Brazil. It deals for the most part with those cutaneous and muco-cutaneous lesions ascribed to the action of *L. brasiliensis*. The conditions are minutely set out and the descriptions cannot be here reproduced in detail.

Two non-ulcerating cutaneous forms are first described. The one—a papillomatous type—occurs as small hemispherical nodosities, which may attain the size of a pea, the affected area being of a deep red colour and excreting an ichorous fluid which in time forms a more or less thick crust. In the second variety large irregular nodosities are formed which may assume a cauliflower-like appearance. In both varieties there is a great tendency to haemorrhage, especially where particles of tissue have been removed for the purpose of making smears. The condition may persist for 15 years or more without ulceration. Any part of the body may be attacked but it is most frequently found on the legs.

The author then proceeds to describe the ulcerating varieties of the disease, dealing first with those affecting the skin only and then the varieties affecting also the mucous membranes.

The skin condition commences with itching, at the site of which a papular erythema develops. Two to five days later pustules form which break down. The itching now ceases and the stage of ulceration begins. Spontaneous cure is uncommon.

Leishmaniasis of the mucous cavities is *always* mucocutaneous. It begins in the same way as the preceding variety, is exceedingly intractable and is regarded by the author as "malignant."

Two observations are given as being clinically important for differential diagnosis: (1) leishmaniasis does not attack the nasal bones and may thus in advanced conditions be distinguished from syphilis; (2) ulcers on the lips and at the edge of the nostrils which just touch the mucosa without however invading it are due to *Treponema perleuiue*.

E. J. W.

d'UTRA e SILVA (Oscar). **Sobre a Leishmaniose tegumentar e seu tratamento.** [On Cutaneous Leishmaniasis and its Treatment.] —*Mem. Inst. Oswaldo Cruz.* 1915. Vol. 7. No. 2. pp. 213-248. With 11 plates and 2 text-figs.

A very complete account of cutaneous leishmaniasis, as it occurs in Brazil, and of its treatment with tartar emetic according to the method of VIANNA. So much has appeared in print on this subject already, of recent years, that the author has not much that is additional to communicate, in the way of information. His practical experience, however, has been large, and his results in the way of treatment appear to be very successful. The dose of tartar emetic recommended for the treatment of cutaneous leishmaniasis ranges between 5 centigrammes for a minimum and 1 decigramme for a maximum, for a single dose, dissolved in 100 times its weight of distilled water and filtered through a Chamberland filter [see illustration]. In 44 per cent. of the author's cases, from 10 to 20 injections sufficed for a cure, in 33 per cent. 20 to 30 were required, and in 5.5 per cent. over 30, while in 11 per cent. less than 10 sufficed. Two or three injections should be given per week to begin with and the injections may be increased to one per day as the case proceeds, if found necessary, but the author strongly insists on the difference between a dose that can be tolerated by the patient, and that which will suffice for cure. The latter should always be the one aimed at. Salivation, nausea and diarrhoea, with headache and sore throat, are the penalty of excessive doses.

J. B. Nias.

ESCOMEL (Edmundo). **Leishmaniasis cutanea curada por el tartaro emetico.** [A Case of Cutaneous Leishmaniasis cured with Tartar Emetic.]—*Cronica Med.* Lima. 1916. July. Vol. 33. No. 637. pp. 207-208.

A report of a case of leishmaniasis of the ear, chin and leg in a Japanese, which was cured by VIANNA's method. The ulcers were powdered with dry tartar emetic, after a previous application of BONNAIN's anaesthetic liquid (equal parts of menthol, cocain and crystallized carbolic acid), which was allowed to act for two minutes. The surfaces were then covered with borated cotton-wool for 24 hours to allow of the formation of a slough, and afterwards dressed with CHAMPIONNIERE's ointment (zinc, bismuth, balsam of Peru, xeroform and vaseline), until healthy granulations were obtained. The local

treatment was thus rendered painless. Simultaneously an endovenous injection of 5 cc. of a 1 per cent. solution of tartar emetic was given, followed by a second one of 10 cc. in a week's time. Complete cicatrization was obtained in 20 days from the commencement of treatment.

J. B. N.

DUDDING (J. S.). **A New Treatment for "Oriental Sore."**—*Jl. Roy. Nav. Med. Serv.* 1916. July. Vol. 2. No. 3. p. 348.

A record of a case of ulcer of the leg which had resisted ordinary methods of treatment for 16 months and which was healed in eleven days by the application of a solution of malachite green perchloride of mercury. It would, however, appear from the context that the diagnosis of "Oriental Sore" was made on clinical grounds and that leishmania were not detected.

E. J. W.

FINZI (Guido). **Leishmaniose et tuberculose chez le chien.**—*Bull. Soc. Path. Exot.* 1916. July. Vol. 9. No. 7. pp. 429-432.

The description of a case of leishmaniasis combined with generalized tuberculosis in a dog, naturally infected in Africa which died in Turin. The author remarks that parasites "easily identified as *L. infantum*" were found in smears made from the spleen. Leishmania were also found in the peripheral blood.

E. J. W.

YELLOW FEVER.

WEST AFRICA, YELLOW FEVER COMMISSION. Reports on Questions connected with the Investigation of Non-Malarial Fevers in West Africa. Vol. III. viii + 291 pp. With maps & illustrations. 1916. London: J. & A. Churchill. [Price 10s. 6d. net.]

This volume is divided into seven parts as follows:—

1. Report of the Entomological Investigation undertaken for the Commission for the year, August, 1914, to July, 1915. By A.W. BACOT, F.E.S. (*Entomologist to the Lister Institute of Preventive Medicine*).
2. Correspondence relating to the possibility of the introduction of Yellow Fever by land into Sierra Leone, *illustrated by one map*.
3. Correspondence relating to the possibility of the introduction of Yellow Fever by land into the Gold Coast, *illustrated by two maps*.
4. Correspondence relating to the introduction of infection into the West African Colonies by sea.
5. Report on the examination of human blood in England for the presence or absence of "Seidelin Bodies" (*Paraplasma flavigenum*), the so-called parasite of Yellow Fever. By John Westray CROPPER, M.B., Ch. B., M.Sc. (Liverpool). (*The John Howard McFadden Researches, The Lister Institute of Preventive Medicine*).
6. Notes on the rearing of *Stegomyia fasciata* in London. By Malcolm Evan MACGREGOR (*Wellcome Bureau of Scientific Research*).
7. Some observations on Fevers investigated in Quittah, March to June 1914. By G. E. H. Le FANU, M.B., C.M. (Aberdeen), D.T.M. (Liverpool). (*West African Medical Staff*).

Parts 1 and 7 are dealt with under separate headings in this issue of the *Bulletin*, and Part 6 in Vol. 7, p. 190.

In Parts 2 and 3 it is seen that there is free intercommunication by numerous trade routes between the Colonies concerned and adjacent countries.

In Part 4 are included the results of examinations of vessels of all kinds with respect to the possibility of conveyance of mosquitoes and larvae. It would appear from a study of this section that the introduction of infected insects by sea into the West African Colonies is improbable.

E. J. Wyler.

BACOT (A. W.). Report of the Entomological Investigation undertaken for the Commission for the Year, August, 1914, to July, 1915.—Yellow Fever Commission (W. Africa). Reports on Questions connected with the Investigation of Non-Malarial Fevers in West Africa. 1916. Vol. 3. pp. 1–191.

The work embodied in this Report was carried out for the most part at Freetown, Sierra Leone.

As a result of the outbreak of war the original scheme of work instituted by the Yellow Fever Commission had to be modified and the investigations of the entomological section were largely confined to the confirmation and elaboration of the existing knowledge concerning the bionomics of *Stegomyia fasciata*.

The following is a summary of the chief conclusions arrived at :—

“ Mosquitoes at Freetown.

II.—Bionomics of *Stegomyia fasciata*.

(A.) Eggs.

“(a) *Shape and structure*.—The dark spindle-shaped eggs of *S. fasciata* vary considerably in shape and size, affording specimens which approximate closely in general appearance to those of the allied *S. sagens*, *S. luteocephala* and *S. simpsoni*, all of which differ appreciably among themselves.

“The bosses with which the eggs are studded are not mere structural excrescences of the shell, but are pockets containing small masses of a substance which, unlike chitin, is readily stained by haematoxylin; these bosses are possibly connected with the ability which the eggs seem to possess of replacing moisture lost through desiccation.

“(b) *Laying*.—If actually laid on the water surface they are usually deposited so close to the margin as to become stranded by capillary action on the sides of the pools, or on partially submerged objects, such as dead leaves, lying in it. In many instances eggs were laid on wet surfaces quite beyond the limit of capillary action.

“(c) *Hatching and the conditions which control it. Experiments I. to XVIII.*—Incubation seems to invariably follow laying within 30 to 40 hours, at the Freetown temperature, but the hatching of any given batch may be distributed over a lengthy period. Apparently the eggs are endowed with a complex constitution, which allows of the whole of a batch hatching together, so soon as they are placed in water, or of a scattered emergence of the larvae consistent with the view that some internal machinery which produces zonal or sectional hatching has been called into action. Experiment No. XVIII. suggests that the latency or activity of this machinery is determined by the conditions of humidity or drought which prevail after incubation. When a batch of dried eggs is placed in water a certain proportion generally hatch within a few minutes or hours, but others, apparently belonging to the same hatching zone, may resist the first or second immersion, yielding to some subsequent one. Similar powers of resistance will probably be shown by a proportion of the eggs in each hatching zone of a given batch.

“After a series of experiments, Nos. IV. to XIII, in which various possible factors were tested, evidence was obtained that cooling to the extent of some 5° or 10° F. acted as a stimulus to induce the hatching of eggs that would otherwise have deferred doing so (Experiments Nos. XIV. to XVI.). A response to cooling accords well with the needs of the species, as a distributed emergence of larvae so arranged allows of full advantage being taken of the increased facilities afforded for breeding in small and rapidly drying pools with the advent of rain.

“*Experiment No. XIX.*—Agitation of the water, mentioned by Mitchell* as a factor in the hatching of eggs, failed to give any decisive result.

“Bacterial action would appear also to be an important factor in hatching and in some instances to be essential.

“(d) *Period of viability. Experiment No. XX.*—The period during which the eggs retain their viability would seem to be to some extent conditioned by temperature, humidity and ventilation, but, owing to the destruction of stored eggs by book-lice (*Psocidae*) (Experiment No. XXII.), no adequate statistical evidence on this point was obtained. The longest period of viability was 262 days; in another test large numbers hatched after 200 days' dry storage. When kept continually immersed some eggs did not hatch for periods of from two to five months. (Experiments Nos. V., VI. and VII. show examples.)

“(e) *Temperatures which the eggs are able to survive. Experiment No. XXI.*—Eggs brought back from Freetown and those laid in England hatched after exposure to 28° F. and 30° F. for 24 hours, but none hatched after an exposure of 25 days. 24 to 28 hours at 96° F. did not greatly, if at all, affect the percentage hatching at Freetown. In the experiment carried out at the Lister Institute there was a marked difference in the hatching percentage of Freetown eggs and those laid in London

after exposure to 96° F. A few hatched after 24 hours' exposure to 102° F., but all the eggs of a batch placed at 108° F. for 24 hours failed.

"(f) *Enemies of eggs.* *Experiment No. XXII.*—The only active enemy discovered was a species of book-lice (*Psodidae*) which wrought immense havoc among the stocks of stored eggs. Ants, considering the untiring activity of their search for the smallest particle of food, seemed strangely indifferent to the eggs.

(B) LARVAE AND PUPAE.

"The larval period is conditioned by temperature and food, breeding tests dealing with the latter factor only were practicable at Freetown, although some trials concerning the survival limits in regard to temperature were carried out.

"(a) *Experiments Nos. XXIII. to XXV.*—A very wide range of organic matter will serve as food for the larvae of *S. fasciata*, and the water may be so heavily charged as to become foul and thick, without harming the larvae, so long as it remains free of scum, floating oil or fat.

"(b) *Period of larval life.*—Under the most favourable circumstances the larval life is passed within four days; on the other hand, with a scarcity of food, it is prolonged for upwards of 70 days. In tap water of average purity the larvae are unable to pass the first moult apart from added nutriment, but they continue to mark time until the death of their fellows enables a few to complete their development. Probably, in an uncovered breeding pool the fall of organic dust would be sufficient to afford food for a fair number of larvae.

"(c) *Small adults reared from starved larvae.*—Shortage of food results in the production of small sized adults—a somewhat important point on the practical side. Well-covered cleanly cisterns therefore require cover of specially small mesh wire gauze (not less than 18 × 18), there being always a danger that eggs will be washed in from gutters during rain.

"(d) *Interaction between larval growth and the development of bacteria.* *Experiments Nos. XXVII. and XXVIII.*—Experiments show an apparent association between the speed of larval growth and the development of bacteria. The scarcity of bacteria in the gut of larvae taken from water swarming with these organisms is probably evidence of the speed with which bacteria are assimilated, as it seems improbable that, by the use of the mouth brushes, or any other means, the larvae could avoid swallowing them. The marked clearing action of mosquito larvae in foul water affords a parallel instance of interaction between them and the bacteria, although this might be a secondary effect due to the absorption of organic matter by the larvae, and not the ingestion of the bacteria. Experiment No. XXVIII. affords evidence of this interaction, and shows that, when two similarly stocked beakers were prepared, in one of which bacterial action was given four days' start of the larvae, the bacteria absorbed nutriment, which, even in the event of the larvae devouring them, could not be regained.

"(e) *Temperature which the larvae and pupae are able to survive.* *Experiment No. XXIX.*—Larval growth and pupal development proceeded normally in a large tin exposed to full sunlight—the temperature of the water rising to 103° on one occasion. Trials with larvae and pupae taken from this tin showed that the upper limit of temperature they could survive lay between 112° F. and 115° F. As regards cold, pupae reared at 80° F. remained active at 50° F., but about half the larvae submitted to the test became stiff and immobile at this temperature, quite irrespective of size. With a further reduction to 40° F. all the larvae became immobile at the bottom, while the pupae, with two exceptions, also lost all power of movement, but remained at the top. Both larvae and pupae recovered when the temperature was allowed to rise, but there was a mortality of 6 out of 40 larvae and 2 out of 24 pupae submitted to the test.

"(f) *Survival of larvae and pupae when submerged.* *Experiment No. XXX.*—183 larvae and 40 pupae were submerged in a wire gauze tube of 18 × 18 mesh for 20 hours; 8 per cent of the pupae and 27 per cent. of the larvae survived.

"(g) *Survival of larvae on wet filter paper.*—Two larvae in their fourth skins were stranded on a piece of filter paper which was kept continually wet; one lived three and the other 10 days.

"(h) *Enemies of the larvae.* Experiment No. XXXII.—As pointed out by MacGregor,* the larger larvae of *S. fasciata* apparently consume the smaller ones; mortality from this source seems to be limited to larvae undergoing the first moult being ingested by those in their fourth instar. The habit of breeding in small collections of water, while saving the species from the attacks of many enemies, enhances the danger of fratricide, but the species is safeguarded from this risk to a considerable extent by the intermittent hatching of the eggs. Tadpoles, as stated by several authorities, certainly do not attack well-grown mosquito larvae, though they probably have a checking influence, owing to competition for food. It seems possible, however, that the small larvae undergoing their first moult, might be engulfed by tadpoles with other food. A small water-bug, found in rock pools, attacks the larvae of *S. sugens*, and probably other species as well, but it was never seen in sufficient numbers to be a serious check. A species of *Ostracoda*, belonging to the genus *Cyprii*, seems to be inimical to mosquito larvae, apparently as a competitor for food.

(C) ADULTS.

"(a) *Pairing and feeding.*—In captivity there seems to be no regular precedence either of pairing or feeding; both functions are practised at any hour of the day or night—late afternoon being perhaps most favoured. The act of pairing commences during flight and occupies only a few moments, but is possibly repeated at frequent intervals. A single male is able to impregnate 10 females more or less effectually, and to fertilize 750 eggs (Experiments Nos. XLVI. and XLVII).

"(b) *Development of eggs.* On a single meal of blood and also on blood other than human.—In feeding satiety is evidently aimed at, and an interrupted meal is completed as speedily as possible; a perspiring skin attracts more readily than a dry one. A single full meal of blood is sufficient for egg production in many cases, possibly for all, though the eggs are sometimes retained for many days. The blood of rats, dogs, goats and bandicoots seems just as effective for the development of the ovaries as human blood, but blood taken up from a living host seems to be a practical, though not a theoretical, necessity. Fed on blood mixed with syrup. Experiments Nos. XLIV. and XLV.—A single fertile egg was laid when the only food given was blood from a sheep mixed with syrup.

"(c) *Feeding in relation to egg laying.*—Females with ripe ovaries usually refuse to feed until they have deposited the bulk of their eggs, when they feed greedily. Females in their period of greatest vigour tend to develop and lay their eggs in masses at about three-day intervals, feeding on the first and second days after depositing their eggs, and fasting while the ovaries are full; Experiment No. IX. and the Appendix to Experiment No. XLVI. are typical instances. The female used in the latter experiment laid 837 eggs in twelve batches, exclusive of odd eggs, while the former, in 22 days, laid 712 eggs in fifteen batches.

"(d) *Retention of eggs.*—Fertilized females that have only received a single meal of blood may retain their eggs for a considerable period before laying them; Experiment Nos. XLI. and XLII. show examples.

"(e) *Choice of situation for depositing eggs.*—Tests showed that the widely-held opinion that the kitchen and boys' quarters are the most likely situations to look for *S. fasciata* was in the main correct, but it seems questionable if the preference is not as much due to the likelihood of there being foul water present, as to the chance of feeding on the boys. No eggs were ever deposited in a jar of clean water kept in the boys' bedroom.

"In the mosquito house a wooden tub or tin pans were favoured as against a galvanized iron pail; Experiment No. XXXIII.

"(g) *Eggs not laid apart from wet surfaces.* Experiment No. XLIII.—Fertilized females regularly fed on human blood would not oviposit when no wet surface or water was available.

"(h) *Length of adult life.* Experiment Nos. XXXV to XL.—The longest lived specimen was the female used in Experiment No. IX, which was killed by ants after 95 days. The longest lived male life was 50 days, in Experiment No. XXXVII. Average lives of 29 days for males and 44

* "Journal of Tropical Medicine and Hygiene. No. 17, Vol. 18. 1st Sept., 1915, page 195."

days for females are shown in Experiment No. XXXVIII, the specimens being fed on syrup and kept in a still and, for Freetown, not very moist atmosphere. Specimens kept in wire gauze tubes give very much lower averages, and no evidence was obtained that *S. fasciata* can habitually, or is likely, save under very exceptional circumstances, to tide over the dry season in the adult stage.

"(i) *Enemies in the adult stage.* Experiment No. XLVIII.—Owing to its retiring habits, *S. fasciata* probably suffers more from wingless than winged foes once it has gained entrance to a dwelling. Ants proved themselves to be deadly foes to caged mosquitoes; two species of spiders, one a small web spinner, the other larger, spinning no regular web, practically lived on *S. fasciata* in the mosquito house, and a small flattened scorpion was also discovered, which ate large numbers when confined in the same box with it. Young mantidae were also found to capture and devour them. Ants, spiders and, perhaps, the scorpion are probably serious enemies even to active, unconfined specimens; the continual waving of the raised hind legs of the resting insects is, I suspect, a measure of preparedness to avoid attack by wingless foes.

"A slender wall-haunting lizard quickly cleared a large cage of *S. fasciata* and probably acts as a salutary check to their increase.

III.—Parasites.

"The only parasites encountered were a gregarine *Lankesteria culicis* Wenyon and a species of yeast.

IV.—Sterility of the Pupal Gut.

"Experiments carried out in collaboration with Dr. G. G. Butler, although not conclusive, point to the probability of the sterility of the pupal gut, in so far as infection by bacteria is concerned.

VI.—Eggs Laid on Fallen Leaves in Water-holes.

"Eggs are laid on fallen leaves lying in water-holes. The following species were bred from leaves taken from an empty water-hole in January and immersed in March :—

"233 specimens of *S. fasciata*; 24 of *S. simpsoni*; 81 of *S. luteocephala*, and 14 *Ochlerotatus apicoannulatus*.

VIII.—Experiments Dealing with the Destruction of *S. fasciata*.

Experiments Nos. XLIX, LI, LII, LIII.

"Naphthalene at 1 in 4,000, under the conditions of Experiment No. LI, is an effective larvicide. [Young larvae were placed in 4,000 cc. of tap water, and 1 gramme of naphthalene was sprinkled on the surface. The water was contained in a tin six inches in depth with an approximate surface area of 80 square inches. With the tin uncovered, most of the larvae were quickly killed, but a few survived. With a covered tin all the larvae were killed, and also pupae and adults emerging from them.] At 1 in 8,000 it is more effective than petroleum, but allows of a few survivors. Soft soap, at less strength than 1 in 1,000, is not an effective larvicide.

"Emulsions of soft soap and petroleum are far more effective larvicides than either of them used separately, killing all larvae and pupae at 1 in 16,000 (water temperature about 80°, experimental pans covered with cheese cloth). With naphthalene added to the emulsion it was equally effective at 1 in 20,000.

"As against submerged eggs petroleum and soft soap emulsion at 1 in 8,000 is not effective in killing the larvae within the eggs. It has the result, however, of inducing a high percentage of the less resistant eggs to hatch at once, when the young larvae are killed.

IX.—Effect of Salt Water on Larvae, Pupae and Eggs of *S. fasciata*.

Experiments Nos. LIV to LVII.

"Salt water (from Freetown Harbour) speedily kills the larvae of *S. fasciata* but does not destroy the pupae.

"As against the eggs, though it does not destroy them, it causes a high percentage of the less resistant ones to hatch at once and a considerable percentage of the specially resistant. The young larvae, after hatching, are speedily killed by it. The use of salt water for flushing culverts and gutters and watering roads might, if practicable, prove very beneficial. The effect of salt water as a stimulus to hatching appears to be unconnected

with its specific gravity ; a solution of sugar of the same specific gravity gave different results and both differed from the tap water control. Both solutions, however, were apparently responsible for a mortality of 7 per cent.

X.—Size of the Mesh of Netting for use against S. fasciata.

“ Adults can get through 10×13 cotton netting ; they also pass 11×15 of the same material, and 14×14 wire gauze. No evidence of normal specimens escaping through 16×16 wire gauze occurred, but there is little doubt that the dwarf specimens caused by scarcity of food could do so. As suggested by the authorities of the Panama Canal Zone, for safety a mesh of not less than 18×18 should be used.

E. J. W.

LE FANU (G. E. H.). Some Observations on Fevers investigated in Quittah, March to June, 1914.—Yellow Fever Commission (W. Africa). Reports on Questions connected with the Investigation of Non-Malarial Fevers in West Africa. 1916. Vol. 3. pp. 261–291. With 6 charts.

This paper consists of an analysis of 106 native cases : 81 children and 25 adults from seventeen years upwards.

Three cases (all adults) of yellow fever occurred amongst them.

Ninety-four of the remainder were cases of malaria and parasites were found in eighty-eight.

Out of 28 cases diagnosed as malaria and specially investigated for albuminuria, this condition was found in 23. It was also found in a number of children under 2 years of age, the youngest only 8 months.

E. J. W.

WEST AFRICA, YELLOW FEVER COMMISSION. Fourth and Final Report. v + 274 pp. With 34 charts. 1916. London : J. & A. Churchill. [Price 5/- net.]

Since the outbreak of war the work of the Commission has suffered serious hindrance and accordingly it has been thought best to bring it, at any rate temporarily, to a conclusion.

This Fourth and Final Report is divided into five parts. Part 1 deals with the work of the Commission and briefly recapitulates the scope of the preceding Reports. These have been summarised in this *Bulletin*, the first two in Vol. 5, p. 71, and the third in Vol. 7, p. 285. Part 2 deals with the occurrence of various fevers, other than yellow fever among natives and Europeans in West Africa. Part 3 is devoted especially to yellow fever. Part 4 contains suggestions for further research and the general conclusions of the Commission respecting quarantine. Part 5 consists of appendices.

In regard to Part 1, the preceding Reports have, as stated, been already dealt with in this *Bulletin*. The conclusions concerning fevers other than yellow fever (Part 2) are given in the final conclusions of the Commission at the end of this review.

The first sections of Part 3 are concerned with the history of yellow fever on the West Coast up to the date of appointment of the Commission in January 1913. These sections traverse to some extent the ground covered in the Second Report of the Commission. In regard to the relation of the slave trade to the disease, the conclusion is that there was probably little or no connection between them.

The Report then goes on to consider the sporadic cases, the epidemics of 1913 and 1914, and three outbreaks which occurred after a prolonged period of quiescence in Southern Nigeria in September and October 1915. The following remarks are made with respect to the problem of the periods of quiescence between outbreaks which are so characteristic of the course of the disease :—

“ The Commission has elicited no evidence which either proves or suggests that during these intervals the disease is continuously present either amongst the Europeans or amongst the native inhabitants of every place where its presence, at some time or other, has been recognised. It may be there, but the fact has not been *proved*, and it is, in their opinion, more probable that continuity is maintained by the existence of endemic areas and endemic foci than by its continuous and universal prevalence in a mild form amongst the native population, in the same way that Malaria may be said to be continuously and almost universally present.

“ Such foci may also conceivably lead, through movements of man or mosquito, to the establishment of new or secondary foci, in which a similar ‘ smouldering ’ of infection may be maintained.

“ The fact, which has been proved, over and over again, during the period covered by the work of the Commission, that the natives, as a whole, are susceptible to Yellow Fever, although they usually have it in a mild form, is conclusive against the theory of its universal prevalence amongst them. Having regard to the rarity of second attacks occurring in the same individual, it is clear that Yellow Fever belongs to that class of diseases which is characterised by the fact that, as a rule, immunity is conferred by a single attack. Exceptions occur, however, in the case of each of these diseases; and there is no reason to believe that the exceptions are more numerous in the case of Yellow Fever than with the others; indeed, it is probably true that they are less numerous. No one, indeed, denies that in the separate towns of each Colony, in which Yellow Fever has at some time appeared, there are periods during which it is not present among the Europeans. It is not, however, so easy to disprove its continued presence amongst the natives.

“ The question of real interest is, ‘ What happens to the virus in these intervals of absence or inactivity ? ’

“ Upon this it is easy to speculate and advance theories, but so long as we lack the means of identifying with certainty the minor manifestations of the disease amongst the natives, all such labour is useless.

“ It may, however, be well to point out that we know just as little of the life-history of the virus of such a common affection as Measles, although the opportunities of observing and studying that disease have been immeasurably greater than with Yellow Fever. Measles appears in, say, a village, the epidemic runs its course and the disease disappears from the village, but not from the country. After an interval of varying duration it reappears, without in many cases the source of reinfection being discovered, yet it is not suggested that it has really been present in the village all the time.*

“ But in a country in which a disease is constantly met with, the virus, if not again and again introduced, must in some way be kept in a condition of potential activity.

“ Apart from some animal, or man, or the mosquito, and the native must be the man, and the *Stegomyia* the mosquito, we have no knowledge as to how this can be effected in such a disease as Yellow Fever, and naturally it is around man and the mosquito, both known to be concerned, that discussion centres as the possible ‘ reservoir.’

“ How the solution of this difficult problem may possibly be reached is discussed in the section of the report dealing with ‘ Suggestions for further research ’ (*vide page 253*).”

The types of the disease as it is found in West Africa are then fully discussed, details with charts being given of mild and severe types in

* “ We hear, however, that the suggestion is about to be made.”

natives and Europeans. The question of symptomatology, diagnosis, and differential diagnosis are then discussed. The conclusions of the Commission in regard to albuminuria in Yellow Fever are :—

“(1) There is evidence that in severe attacks of aestivo-autumnal Malaria accompanied by pyrexia, albumen may be present in the urine.

“(2) That in such cases the amount of albumen is generally a mere trace.

“(3) That the albuminuria does not run a clinical course in any way similar to that observed in Yellow Fever.

“(4) That it is probably a pyrexial albuminuria, and is similar to that occasionally met with in Pneumonia, Typhoid Fever, and other acute febrile diseases.

“(5) That casts may be present, but are only found in very severe cases of malarial pyrexia, whereas they are commonly met with in Yellow Fever, and may, in that disease, be bile stained.

“(6) That the evidence from West Africa affords no support to the contention that albuminuria is of common occurrence in Malaria as observed in that country amongst Europeans.

“(7) That the frequent occurrence of urethritis, either acute or chronic, amongst the natives of West Africa, indicates the necessity for eliminating that source of error in all cases of pyrexia suspected to be due to Yellow Fever.

“(8) That the diagnostic value of albuminuria as a symptom of Yellow Fever remains unimpaired.”

Under the heading “Hyperpyrexial Fever and Hyperpyrexia in Malaria and in Yellow Fever,” the following remarks are made at the end of a selection of typical examples :—

“In each of these cases, although the evidence is defective in certain important particulars, it is, we think, difficult to arrive at any other diagnosis than that of Yellow Fever, which was the opinion formed by the medical officers, who either saw the case or made the post-mortem or pathological examination. If this view is correct, the cases are sufficient to establish the fact that hyperpyrexia may be a feature of Yellow Fever, and that a careful examination of the blood is necessary in all such cases before it is concluded that they are cases of Malaria. The defects in the evidence are due to the fact that all the cases occurred on board ship.”

The conclusions concerning a disease (or diseases) of uncertain nature known to the natives by the names Uto-Enyin, Bayloo, and Bonke are :—

“1. That it occurs in a sporadic form and also in epidemics.

“2. That at least two different types of attack are recognisable.

“3. That one may cause death in five or six days.

“4. That the other may assume a sub-acute or chronic form.

“5. That the onset is sudden with acute febrile symptoms.

“6. That all ages and both sexes are affected.

“7. That it may be attended with a high mortality.

“8. That in some places it is recognised that one attack affords no protection against another, whereas in other places opinion is divided upon the question.

“9. That the finger nails may become yellow.

“10. That the most constant symptoms are :—

(a) Pyrexia. (b) Malaise. (c) Prostration. (d) Pains in various parts of the body. (e) Jaundice. (f) A dark colour of the urine. (g) Vomiting.

“11. That some, at least, of the cases are due to malarial infection.”

The Commission recommends the following procedure in connection with the notification of cases of yellow fever and the declaration of a place as an infected place, and the declaration of Quarantine :

“(1) On the occurrence of a single case or of two or more cases of Yellow Fever, affecting either Europeans or natives, the Government of the

infected Dependency shall notify the Governments of the other Dependencies, British and others, in accordance with the present instructions 1, 2 and 3 set out above.

"(2) On the occurrence of two cases of Yellow Fever, non-imported, either in Europeans or natives, the Government of the infected Dependency shall exercise its discretion as to declaring any place to be an infected place, as defined in the Quarantine Regulations, having regard chiefly to :—

(i) The distance of the place or places infected from the coast or frontier ;

(ii) the interval, both in time and distance, between the first case and the second, as indicating the existence of a single focus of infection or of more than one such focus ;

(iii) the efficiency of the measures already taken to prevent the further spread of the disease within the Colony or Protectorate and the transmission of the disease to any other country or colony.

"(3) On the occurrence of three cases of Yellow Fever in any Dependency, the Government shall forthwith declare the Dependency an 'infected place' within the meaning of Regulation 1 of the Schedule of the Quarantine Ordinance.

"(4) On the receipt of the information described in the Instructions, as to the existence of one case or of two or more non-imported cases of Yellow Fever in any Dependency, the Governments of the other Dependencies shall exercise their discretion as to a declaration of quarantine against the infected Dependency, having regard (1) to the efficiency of the measures already taken to prevent the further spread of the disease, (2) to their knowledge of the sanitary conditions prevailing in the infected Dependency and the reputation of its administration, and (3) to the probability of the disease being transmitted to their own Dependency.

"If it is objected that to give a discretionary power as to declaring a place an 'infected place' up to three cases, instead of two as at present, is likely to favour the spread of the disease, it may be pointed out that, speaking generally, medical and sanitary administration is becoming increasingly efficient and the recognition of cases correspondingly more accurate; and also that the larger number is a presumptive indication, either of the existence of more than a single focus, or that the outbreak has not been brought under efficient control.

"Moreover, many declarations of quarantine would have been obviated by the change recommended, and the experience of the last few years has shown that no harm would have resulted had it been in force during that period. It may be pointed out that the suggested change does not limit the powers as to a declaration of quarantine by the non-infected Dependencies; it merely allows the exercise of their discretion.

"There is no doubt that, in the past, cases of Yellow Fever have been concealed in order to evade the necessary declaration of infection, and that at least one of the Governments concerned, whilst declaring quarantine according to the present regulations, has established a land cordon against its neighbours contrary to the regulations dealing with the adoption of that measure.

"Possibly any Power which has acted thus in the past will continue to act in the same manner, but this should not, in the opinion of the Commission, prevent the adoption by the British Dependencies of less stringent regulations, which, at least as between each other, they may feel certain will be honourably administered."

Under "Suggestions for Further Research" attention is drawn to a scheme (Appendix 3) for a systematic research, by Dr. A. CONNALL, Director of the Medical Research Institute, Lagos, which cannot be summarised.

The General Conclusions at which the Commission have arrived are as follows :—

"(1) That the following fevers, other than Yellow Fever and Malarial Fever, are met with on the West Coast of Africa, viz. :—Typhoid Fever, Paratyphoid Fever, Pappasici Fever, and (possibly) Undulant Fever and

Seven Days' Fever, and possibly also Dengue Fever in a sporadic form, but that there is no evidence of the occurrence of widespread epidemics of any of these fevers in recent times.

"(2) That Malarial Fever is the most widely spread of the fevers met with in West Africa.

"(3) That Yellow Fever is an endemic disease of the British and other Dependencies on the West Coast of Africa. No sufficient evidence has been obtained that the disease occurs in the Republic of Liberia.

"(4) The number of cases diagnosed in the British Dependencies as Yellow Fever has not exceeded sixty in any one year during the last six years, nor one hundred and eighty in all; but the Commission are of opinion that many more cases have occurred.

"(5) That probably the continuous presence of the disease is maintained by the existence of endemic foci and areas or otherwise, rather than by its almost universal prevalence amongst the native population.

"(6) That the native population is not immune to Yellow Fever, although, as a rule, when attacked, the natives suffer from a milder type of the disease than the Europeans.

"(7) That the nature of the virus of Yellow Fever remains unknown.

"(8) That there is no evidence that Yellow Fever has been brought to West Africa during recent periods from outside Africa.

"(9) That epidemics of a disease have occurred in other parts of Africa presenting some features of a character similar to those met with in Yellow Fever, and that in these epidemics the mortality amongst the natives appears to have been much greater than usually now occurs when natives of the Dependencies on the West Coast are attacked by Yellow Fever.

"(10) That a disease of uncertain nature, known to the natives by various names, as for example, Bayloo, Uto Enyin, or Yellow Eyes, prevails in certain Dependencies, usually at a distance from the coast.

"(11) That the knowledge of the diseases, other than Malaria, common amongst the natives, both children and adults, inhabiting the 'bush' is very defective.

"The Commission feel that it is hardly necessary to emphasize the prime importance of a vigorous prosecution of anti-mosquito measures against all mosquito-borne diseases."

E. J. W.

CARTER (H. R.). **Immunity to Yellow Fever.**—*Ann. Trop. Med. & Parasit.* 1916. April 29. Vol. 10. No. 1. pp. 153-164.

Further evidence is produced in favour of permanent immunity from yellow fever after one attack.

The paper is largely an elaboration of one previously reviewed [this *Bulletin*, Vol. 7, p. 297], the statistics given therein being amplified.

The author summarises his epidemiological data as follows:—

"Thus, between the years 1888 and 1898, there entered Florida ports over thirty thousand people certified as 'Protected from yellow fever by previous attack or ten years' residence in an infected focus.' They came during the summer, May 1st to October 31st, from Havana, where yellow fever prevailed during this time, to Key West and Tampa—towns full of *Aedes calopus* (*Stegomyia*) and of people susceptible to yellow fever. The time of passage was about eight hours to Key West, and twenty-four to Tampa. As no yellow fever developed in Florida during this period, there should have been no considerable number of secondary attacks infective to *Aedes calopus* (*Stegomyia*) among these people.

"That yellow fever could be readily contracted from Havana by people susceptible to it is shown by the fact that during this time four hundred and fifty people from Havana, not certified as immune to yellow fever, yielded thirteen cases of yellow fever at a quarantine station.

"As thirteen cases of yellow fever, any one of which should have been infective to *Aedes calopus* (*Stegomyia*), occurred among four hundred and fifty men who had not suffered from one attack, it would seem that if

recurrent attacks were common, enough cases should have occurred among the thirty thousand to have produced an outbreak in Florida. There was none.

"The above is also evidence that yellow fever carriers are not as common as are alleged by some modern observers; as is also the fact that the quarantine stations of the United States have for many years passed in a large number of people—well over a hundred thousand—from yellow fever ports with no evidence of their having infected *Aedes calopus* (*Stegomyia*) in the United States."

Looked at from the clinical aspect, it is pointed out (and illustrative cases are quoted) that the proof of a second attack is difficult in the absence of a sign, pathognomonic for all cases of yellow fever, the mild and ephemeral as well as the severe.

E. J. W.

MACGREGOR (Malcolm Evan). **Resistance of the Eggs of *Stegomyia fasciata* (*Aedes calopus*) to Conditions Adverse to Development.**—*Bull. Entom. Res.* 1916. May. Vol. 7. Pt. 1. pp. 81–85. With 3 figs.

The author refers to a former paper [summarised in this *Bulletin*, Vol. 7, p. 190] wherein he showed that dried eggs of *S. fasciata* which had left West Africa attached to leaves three and a half months before promptly hatched when put in water. Some were normal looking, others partially or wholly collapsed. Several generations of mosquitoes were raised. It was then found that the eggs were highly susceptible to destruction by desiccation and the author set himself to discover the conditions in which they resisted this process. If eggs laid on water or wet filter paper were removed they began to dry up and collapse and when again placed in water failed to develop. He conjectured that only those eggs which were laid out of water were able to resist desiccation but experiment did not confirm this. Such eggs were collapsed when examined. He then surmised that "not until the egg had been in contact with water for some time and the embryo partially developed was the shell rendered resistant to drying," and this proved to be the case. Eggs laid by ten mosquitoes in a Petri dish were divided into ten batches which were left in water for different periods, and then allowed to dry slowly. Of those left 15, 20 and 25 hours all collapsed after drying for 12 hours, of those left 37, 43, and 48 hours a percentage collapsed, and of those left 60, 65, and 70 hours none collapsed. These eggs had become resistant to desiccation. Photographs are given of collapsed and of normal-looking resistant eggs. The former failed to hatch, the latter hatched out six hours after being put in water. The author does not fail to note that "the degree of humidity of the atmosphere in certain tropical places may play an important rôle in allowing even freshly laid eggs when removed from the water to develop their resistant powers."

A. G. B.

PROTOZOOLOGY.

FANTHAM (H. B.) & PORTER (Annie). **The Significance of Certain Natural Flagellates of Insects in the Evolution of Disease in Vertebrates.**—*Jl. Parasit.* 1916. June. Vol. 2. No. 4. pp. 149-166. With 2 text figs.

This paper contains the substance of previous ones published in England and noticed in this *Bulletin* [Vol. 5, p. 280; Vol. 6, p. 181; Vol. 7, p. 87]. A useful feature is a table of the various experiments, which is reproduced.

The summary is as follows :—

"1. Herpetomoniasis can be induced in various warm and cold-blooded vertebrates when the latter are inoculated or fed with herpetomonads occurring in the digestive tracts of various insects. The infection produced and the protozoal parasites found in the vertebrates resemble those of human and canine leishmaniasis.

"2. An infection can also be induced in certain vertebrates when they are fed or inoculated with *Crithidia gerridis*, and both flagellate and non-flagellate stages occur therein, but no transition to a trypanosome was found.

"3. The following Flagellata have been proved pathogenic to warm-blooded vertebrates when the latter have been fed, or inoculated subcutaneously or intraperitoneally with them—*Herpetomonas jaculum*, *H. stratiomyiae*, *H. pediculi*, *H. ctenocephali*, *H. culicis* and *Crithidia gerridis*. The hosts used were mice of various ages, dogs, canaries, sparrows and martins.

"4. *Herpetomonas jaculum* and *Crithidia gerridis* have also been successfully fed or inoculated into cold-blooded hosts, namely, fishes (*Gasterosteus aculeatus*), frogs, toads, lizards (*Lacerta vivipara*) and grass-snakes (*Tropidonotus natrix*).

"5. The disease induced may run an acute or a chronic course. In the acute cases among our vertebrates the flagellate form of the parasite was the more obvious at death. In chronic cases, non-flagellate forms of the parasite were more numerous.

"6. Natural herpetomoniasis of a pigeon has been recorded by Drs. Edm. and Et. Sargent in Algeria. This affords a parallel case with the natural and induced herpetomoniasis of mice as recorded by us.

"7. The flagellate stage of *Leishmania donovani* in vertebrates is now known, and that of *L. tropica* in man has been known for some time. The links completing the evidence that a *Leishmania* is morphologically a *Herpetomonas* are thus complete. We believe that leishmaniasis are invertebrate-borne herpetomoniasis, and that these maladies have been evolved from flagellates of invertebrates (especially herpetomonads of insects), which have been able to adapt themselves to life in vertebrates.

"8. In areas where leishmaniasis are endemic an examination should be made of all insects and other invertebrates likely to come into contact with men or dogs or domestic vermin like rats and mice, in order to ascertain if these invertebrates harbor herpetomonads. Preventive measures should be directed against such invertebrates, especially arthropods. Further, it is likely that members of all classes of vertebrates, and especially those members that are insectivorous, may serve as reservoirs for leishmaniasis, or as they should preferably be termed, herpetomoniasis. The virus may exist in such reservoirs in a very attenuated condition and so be difficult of detection. From these sources the herpetomonads may reach man by the agency of ectoparasites or flies, especially such as are sanguivorous."

A. G. B.

TABLE.—Results of the Experimental Infections of Different Vertebrates with Various Herpetomonas and Crithidia from Insects.

No. of Experiment.	Vertebrate Host.	Flagellate Introduced.	Mode of Introduction.	Duration of life of Host.	Effect on Host.	Forms of Parasites observed in the Vertebrates.	Remarks.
1	Wild mouse, <i>Mus musculus</i> , ♀	<i>H. jaculum</i>	Feeding	50 hours	Acute herpetic moniasis	Flagellate and non-flagellate	Young host.
2	Wild mouse, ♂	<i>H. jaculum</i>	Feeding	70 hours	Acute herpetic moniasis	Flagellate and non-flagellate	Young host.
3	Wild mouse, ♀	<i>H. jaculum</i>	Intraperitoneal inoculation	60 hours	Acute herpetic moniasis	Flagellate and non-flagellate	Young host.
4	Wild mouse, ♂	<i>H. jaculum</i>	Feeding	60 hours	Acute herpetic moniasis	Flagellate and non-flagellate	Host killed in extremis.
5	Wild mouse, ♀	<i>H. jaculum</i>	Feeding	84 hours	Acute herpetic moniasis	Flagellate and non-flagellate	Host killed when very ill.
6	Wild mouse, ♂	<i>H. jaculum</i>	Intraperitoneal inoculation	72 hours	Acute herpetic moniasis	Flagellate and non-flagellate	Host killed in extremis.
7	Adult mouse, ♂	<i>H. jaculum</i>	Intraperitoneal inoculation	Killed after 8 months	No symptoms of disease	Flagellate and non-flagellate	Spontaneous cure. No parasites found at autopsy.
8	Mouse, ♂	<i>H. stratiomyiae</i>	Feeding	5 days	Herpetomoniasis induced	Non-flagellate and some immature flagellate	Young host.
9	Mouse, ♀, adult	<i>H. pediculi</i>	Feeding	72 days	Herpetomoniasis induced	Mostly non-flagellate, very few flagellate forms	Chronic infection.
10	Mouse, ♀, adult	<i>H. pediculi</i>	Fed on liver of No. 9	15 days	Herpetomoniasis induced	Non-flagellate and flagellate	
11	Mouse, ♀, adult	<i>C. gerridis</i>	Intraperitoneal inoculation	40 days	Infection with <i>C. gerridis</i> induced	Flagellate and non-flagellate forms, the latter more numerous	Killed in extremis. Skin sore and alopecia at site of inoculation.
12	Mouse, ♀, adult	<i>C. gerridis</i>	Subcutaneous inoculation	2 months, then killed	Negative		
13	Mouse, ♂, adult	<i>C. gerridis</i>	Feeding	38 days	Infection with <i>C. gerridis</i> induced	Flagellate and non-flagellate, the latter predominating	
14	Dog, <i>Canis familiaris</i> ♂	<i>H. ctenocephali</i>	Feeding	Killed after 15 months	No marked permanent ill-effects	Non-flagellate	Young host. Spontaneous cure. No parasites found when killed.
15	Canary, <i>Serinus canarius</i> , ♀, adult	<i>H. jaculum</i>	Feeding	51 days	Chronic herpetomoniasis induced	Many non-flagellate, a few flagellate	Note chronic infection probably to be correlated with the presence of non-flagellate forms.

16	Sparrow, <i>Passer domesticus</i> , ♀, adult	<i>H. culicis</i>	Feeding	9 days	Acute herperton- niasis induced	Flagellate and non- flagellate, the former predominating	Note acute infection, probably to be cor- related with the pre- sence of many flagel- late forms.
17	Martin, <i>Chelidon urbica</i> , ♂, young adult	<i>H. culicis</i>	Feeding	12 days	Acute herperton- niasis induced	Flagellate and non- flagellate, the former dominant	Note acute infection and many flagellate forms present.
18	Martin, ♀, young adult	<i>H. culicis</i>	Subcutaneous inoculation	2 days			Probably died of fright.
19	Canary, ♂, young adult	<i>H. jaculum</i>	Feeding with infected insect excrement	17 days	Herpertononiasis induced	Flagellate and non- flagellate	
20	Martin, ♂, mature young	<i>H. culicis</i>	Feeding with infected insect excrement	32 days	Herpertononiasis induced	Non-flagellate and a few flagellate	
21	Sparrow, ♀	<i>H. jaculum</i>	Feeding with infected insect excrement	Killed after 3 months		One parasite only seen during life	Spontaneous cure. No parasites found at autopsy.
22	Canary, ♀, adult	<i>H. culicis</i>	Fed on food contaminated with <i>H. culicis</i>	Killed after 80 days	Negative		
23	Grass snake, <i>Tropi- donotus natrix</i> , ♂	<i>H. jaculum</i>	Feeding	20 days	Herpertononiasis induced	Flagellate and non- flagellate	
24	Lizard, <i>Lacerta nivi- para</i> , ♂	<i>C. gerridis</i>	Feeding	19 days	Infection with <i>C. gerridis</i> induced	Flagellate and non- flagellate	Second passage.
25	Lizard, ♂	<i>C. gerridis</i>	Fed on infected liver of No. 24	6 days	Acute disease (orthidiasis)	Flagellate and non- flagellate	Killed for examina- tion after 20 days.
26	Lizard, ♀	<i>C. gerridis</i>	Intraperitoneal inoculation with infected heart blood of No. 25	Killed after 20 days	Slight infection	Non-flagellate	Third passage.
27	Frog, <i>Rana tempor- aria</i> , ♂, adult	<i>C. gerridis</i>	Intraperitoneal inoculation	29 days	Infection with <i>C. gerridis</i> induced	Flagellate and non- flagellate	
28	Frog, ♂, adult	<i>H. jaculum</i>	Intraperitoneal inoculation	54 days	Herpertononiasis induced	Flagellate and non- flagellate	
29	Toad, <i>Bufo vulgaris</i> , ♂, adult	<i>H. jaculum</i>	Subcutaneous inoculation	40 days	Chronic infection	Non-flagellate and young flagellate	
30	Toad, ♀, adult	<i>H. jaculum</i>	Intraperitoneal inoculation	80 days	Negative	None	
31	Newt, <i>Molge vul- garis</i> , ♂, young adult	<i>H. jaculum</i>	Feeding	9 days	Apparently nega- tive	None	Death by misadven- ture.
32	Stickleback, <i>Gaster osteus aculeatus</i> , ♂	<i>H. jaculum</i>	Feeding	2 days		None	
33	Stickleback, ♂	<i>H. jaculum</i>	Subcutaneous inoculation	5 days	Herpertononiasis induced	Flagellate and non- flagellate	

MIGONE (L. E.). **Parasitologie de certains animaux du Paraguay.**—*Bull. Soc. Path. Exot.* 1916. June. Vol. 9. No. 6. pp. 359-364.

An examination of the animals living in rivers, swamps and places subject to inundation in Paraguay has been made by the author. The predominant parasites found were Haemogregarines, Trypanosomes, Myxosporidia, Microfilariae and Linguatulids. The present paper records their distribution in the different hosts and gives brief notes on some of them. Birds, fish, reptiles and mammals were examined.

Three birds were found to be parasitised. *Theristicus caudatus* (Bodd.) had a fairly large number of trypanosomes. They were about three times the length of a red blood corpuscle. Their nucleus was fairly large with a distinct karyosome. *Butorides striata* (L.) had a similar trypanosome, and another was found in *Tantalus americanus*. A list of birds in which no parasites were found is also given.

Five fishes were found to contain parasites. *Pseudoplatystoma coruscans* (Agass.) has haemogregarines in its blood, the skin is full of Myxosporidia, while the intestinal canal, peritoneal cavity, subpleural tissue and costal muscles are invaded by Linguatulids. *Doras armatus* and *Zungaro mangarus* have the same parasites. *Potamotrygon humboldti* (Rouillin) has Myxosporidia, and *Prochilodus argenteus* (Agass.) and *Hoplias malabaricus* (Bloch) have Myxosporidia and Linguatulids.

Among reptiles, Haemogregarines and Microfilaria were found in the blood of *Caiman solerops*, in whose abdomen and lungs cysts of Linguatulids were also found. Haemogregarines occurred in *Ameiva ameiva* (L.) and *Tupinambis teguixin*. The snakes *Eunectes murinus* (L.), *Spillotes pullatus* (L.), *Phyllodrias schotti*, *P. olfersii*, and *Lachesis newwiedi* (Wagl) harboured haemogregarines.

The mammals infected were *Canis jubatus* (Desm.) *Hydrochoerus capybara* (L.), *Myocastor coypus* (Mol.), *Procyon cancrivorus brasiliensis* (Jhering), which all contained microfilariae.

Zungaro mangurus, *Doras armatus* and *Pseudoplatystoma* have reniform haemogregarines with a central nucleus. They were only found in red blood corpuscles. Small schizogonic cysts occurred in the liver and spleen. Some spherical forms as well as the vermicular ones have been seen and may have a sexual significance.

Myxosporidia were most common in fish without scales. At first they were thought to be worms' nests. If dissected with care, a whitish tubercle could be removed. It was about 2 mm. to 3 mm. in diameter, and if crushed, a milky fluid, full of Myxosporidia escaped. The gills, spleen, liver and subpleural tissue all were infected.

A general account of the microfilaria and Linguatulids is also given.

A. Porter.

FEDOROVITCH (A. I.). **Hémoparasites trouvés dans un cas de fièvre chronique.**—*Ann. Inst. Pasteur.* 1916. May. Vol. 30. No. 5. pp. 249-250. With 2 plates.

During the antimalaria campaign on the coast of the Black Sea, the author observed an abnormal case of chronic fever in a ten-year old child. The stomach was enlarged, the spleen descended to the

umbilicus and the liver was hypertrophied. Certain parasites were found in smears of the blood from the ear. They were 3μ to 7μ long. The greater number were elongate, oval, with one drawn out extremity. Other small forms were rounded. The nucleus was central in the round forms, or was at the drawn-out extremity. It was usually round or oval, only exceptionally curved. The life-cycle of the parasite has not been found. The organism was not found in the splenic blood. The parasite resembles *Toxoplasma pyrogenes* Castellani [see this *Bulletin*, Vol. 3, pp. 521-2]. It is of interest to note that a similar parasite was found in the blood of a dog, the smear being taken at the fever crisis. The animal came from the same neighbourhood as the child.

The two plates show the various forms described.

H. B. Fantham.

SHAW-MACKENZIE (J. A.). **The Action of Copper Salts on Protozoa.**—*Med. Press & Circ.* 1916. July 19. Vol. 102. No. 4028. pp. 50-52.

The action of injections of copper salts in cases of cancer led the author to try their effects on certain Protozoa and other micro-organisms. The copper salt of alanine, or amino-propionic acid, and the corresponding salt of amino-acetic acid were chiefly used. Copper alanine is soluble in water, insoluble in alcohol, and soluble in serum; it also gives no precipitate with egg white, milk or caseinogen solutions. Preliminary investigations of its action on Protozoa and vegetable organisms have been made. When *Opalina* from the frog's rectum were placed in a solution of 1 in 20,000, they were killed in a few minutes, 1 in 100,000 killed in 10 minutes and 1 in 200,000 in 11 minutes. *Nyctotherus*, *Balantidia* and *Nematodes* in some of the preparations were not killed within the time limit set.

A concentration of 1 in 100,000 of copper alanine killed *Paramoecium* in 13 minutes. *Hydra* (Coelenterates) were killed in 30 minutes by the same strength. *Amoeba proteus* from pond water had its movements stimulated by a solution of 1 in 100,000 of copper alanine. If a solution of 1 in 40,000 were used the movements ceased after a time but were resumed after half an hour. With a concentration of 1 in 15,000, and 1 in 10,000, movements ceased, the organisms became rounded, but it was uncertain whether the amoebae were quiescent or dead. With strength of 1 in 1,000 and in 300, the amoebae were killed and fixed.

The author has had no opportunity of testing these drugs on the amoebae and bacilli producing dysentery, but thinks that the copper salts of the amino-acids might be employed locally by enemata, intramuscular injection or by the mouth. [Obviously, direct experiments on dysentery-producing organisms are needed first.] A. P.

da FONSECA (Olympio Oliveira Ribeiro). **Estudos sobre os flajelados parasitos dos mamiferos do Brazil.**—*Mem. Inst. Oswaldo Cruz.* 1916. Vol. 8. No. 1. pp. 6-40. With 4 text-figs. & 2 plates.

This interesting paper, which is an extension of two previous papers of the author on the flagellates of the intestines of mammals, should be consulted in the original by those interested in the subject. It is only possible to give a bare outline of the paper here. The author has made

a series of 252 autopsies of the higher animals, and has also examined birds, reptiles, batrachia and insects, while human dysenteric faeces and vaginal discharge have also been examined. A discussion of the classifications of the Flagellata proposed by HARTMANN and by ALEXEIEFF is given, and then a series of descriptions of the flagellates encountered follows. In each instance a list of synonyms, a brief historical summary and the general morphology of the organism are set forth.

Two species of *Sphaeromonas* were found in the rumen of the ox. *S. communis* showed much polymorphism in the position of its flagellum; it was generally about 10μ in diameter. *S. liebetanzy* was elongate and measured usually about 11μ by 5μ to 6μ . The *Sphaeromonas* multiply by binary and multiple fission.

Callimastix frontalis, from the rumen of the ox, *Bos taurus*, the goat, *Capra hircus*, and the sheep, *Ovis aries*, has usually a spherical body, 9μ to 10μ in diameter, but is very occasionally oval, when it is about 11μ by 7μ to 8μ . A group of many flagella, about 30μ to 40μ in length arising from numerous basal granules is present.

Five species of *Chilomastix* are described. *C. bittencourti* occurs in the caecum of the rat, *Mus (Epimys) norvegicus*; *C. caprae* in the rumen of *Capra hircus*; *C. cuniculi* in the caecum of *Oryctolagus cuniculus*; *C. intestinalis* in the caecum of the guineapig; and *C. mesnili* in human faeces. The descriptions of most of these organisms are well known.

Five species of *Trichomonas* have been examined: *T. caviae* from *Cavia porcellus* and *C. aperea*, *T. hominis* from man, *T. muris* from *Mus rattus*, *M. norvegicus* and the albino forms of *M. rattus* and *M. musculus*; *T. tatusi* from *Tatus novemcinctus*, and *T. vaginalis* from man.

A species of *Trichomastix* was found in the caecum of *Cavia aperea*, *C. porcellus* and *Dasyprocta aguti*.

Enteromonas hominis, a spherical form with three flagella, a single nucleus and one basal granule, reproducing by longitudinal binary fission was found in the faeces of a dysenteric patient.

Ohilomitus caviae, *Octomitus muris*, *Giardia cuniculi*, *G. intestinalis*, *G. muris* and *Selenomonas ruminantium* have all been observed in animals in Brazil, where the research has been carried out by the author.

A. P.

KOFOID (Charles Atwood) & CHRISTIANSEN (Elizabeth Bohn).

On *Giardia Microti*, sp. nov., from the Meadow Mouse.—
Univ. California Publicat. in Zool. 1915. Nov. 19. Vol. 16.
No. 2. pp. 23-29. With 1 text-fig.

— On Binary and Multiple Fission in *Giardia muris* (Grassi).—
Ibid. pp. 30-54. With 5 plates and 1 text-fig.

These two papers appear to be further extensions of the earlier one by these authors [see this *Bulletin*, Vol. 8, pp. 18-19].

(1) The first paper contains an account of a new species of *Giardia* occurring in the meadow mouse, *Microtus californicus californicus*. Six hosts were examined, and three were infected. The parasites cause an inflammation of the intestine, whose walls become thin and flaccid.

The body of *Giardia microti* is from 10μ to 16μ long, and the diameter from 5μ to 7μ . The body is elongate pyriform in shape. A rhizoplast

passes from the karyosome through the centrosome at the anterior pole of the nucleus, thence to the blepharoplast of its side of the axostyle. The four pairs of flagella are long and subequal in length, being about $1\frac{1}{2}$ times the length of the body. The parabasal bodies are curved tapering rods, usually lying parallel to each other.

The parasite is compared with other species of *Giardia* from which the organism is said to differ, more especially in the possession of curved parabasals. On this account the organism is named as a new species *G. microti*.

(2) The second paper deals with the life-history of *Giardia muris* studied in "culture mice," *Peromyscus maniculatus gambeli* (Baird) and *Microtus californicus californicus*. 163 of these animals were examined and 29 were found to be infected. Other animals examined were negative. The "region of frequent and maximum infection is the small intestine in the duodenum and occasionally near the caecum, though both above and below the latter it is often severe."

With regard to the morphology and life-history, the authors give a full and concise summary of their paper in the following words:—

"*Giardia muris* occurs in culture mice (grey and white), and in *Peromyscus*, but was not found in *Microtus*; neither it nor other species were found in culture rats, Belgian hares, or coyotes, feeding where *Peromyscus* was taken. It causes chronic enteritis, especially in young hosts, with inflation and yellowish color of intestine.

"The normal trophozoite has a single axostyle, not two as heretofore described, an integrated neuromotor apparatus with fibrillar connections joining the karyosomes, centrosomes, blepharoplasts, flagella, parabasal bodies, and axostyle of the two cells in one more or less continuous system.

"Binary fission occurs abundantly and normally, with delayed plasmatomy. Normal mitosis occurs with intranuclear spindle, and four chromosomes in two groups. Precocious splitting of chromosomes in the prophase is followed by their fusion into a split skein from which the four chromosomes emerge on the equatorial plate. The blepharoplast and axostyle lead in mitosis.

"Multiple fission is of three types: (1) Free individuals form a plasmodium-like somatella of eight fully equipped zooids, in the formation of which the duplication of organelles keeps pace with nuclear multiplication. (2) Free individuals form eight zooids but nuclear multiplication precedes the division of the organelles. Encystment may follow. (3) Encysted single individuals form 8-zooid, 16-nucleate plasmodial masses with chromatic disintegration of organelles, the axostyles persisting longest. The small free zooids are not to be confused with *Hexamitus muris* Grassi, which is a distinct species. We find no evidence of an '*Octomitus*' stage of *Giardia*.

"There is tentative evidence of the fusion of two free individuals and also of copulation cysts which may be derived therefrom with the two gametocyte individuals back to back and of their maturation by two divisions. Chromosome reduction has not been detected in these divisions.

"The most striking feature of the development of the free, 16-nucleate, 8-zooid plasmodium, or somatella, is the preservation in each successive step of the process, of the fully equipped *binucleate individuals*. The *individuality* of the potential zooids is morphologically established and maintained, and there is evidence also of their functional independence in the independent motor struggles of each which result ultimately in plasmatomy. In the cases of multiple fission in cysts and free individuals in which nuclear multiplication outruns that of the other organelles, this individuality is more or less disrupted, or even lost. The possibility that some of these at least may represent involution or pathological states on the part of the parasite itself, should be borne in mind in all attempts to unravel the baffling significance of these protean aspects of this most interesting, suggestive, small, but by no means simple organism."

A. P.

MACASKILL (D. C.). **Flagellate Infection in Caries of the Jaw.**—*Jl. Trop. Med. & Hyg.* 1916. June 15. Vol. 19. No. 12. p. 146.

The patient was a male Tamil, admitted to Kuala Kangsar hospital suffering from swelling and pain of the proximal joints of the limbs, and "caries of the right upper jaw, with a very foul-smelling discharge," which was persistent. When the pus was examined for possible pathogenic entamoebae, there were found "numerous flagellates, pear-shaped, with three flagellae at the broader end and an undulating membrane. The flagellates were very active and corresponded in size and appearance to *Trichomonas hominis* Davaine."

Treatment by emetine was given, half a grain "tabloid" by the mouth three times a day, and two days after this treatment began one-third gram was given subcutaneously. After one day's treatment with emetine, no flagellates could be found in the pus, and on continued treatment, the foul smell disappeared, the pus rapidly became less and the discharge ceased. It is thought that the caries of the jaw was resistant on account of the presence of the flagellates.

H. B. F.

CHAGAS (Carlos) & TORRES (Magarinos). **Fecundação n'um flagelado de vida livre "*Prowazekia Cruzi*" (Hartmann & Chagas). Nota prévia** [The Cycle of *Prowazekia Cruzi*].—*Brazil Med.* 1916. July 15. Vol. 30. No. 29. p. 225.

The paper commences with a brief sketch of the genus *Prowazekia* and the points that distinguish it from *Trypanoplasma*. *Prowazekia cruzi*, described by HARTMANN at the Institut Oswaldo Cruz in 1909, has been found easy for study, as it grows well on agar plates. Two to three days after sowing, flagellates are found on the culture media, and appear to be undergoing sexual processes. At first these forms were interpreted as being parasitic on other Protozoa. Then it was considered that they were really in process of fertilisation. Two flagellates were apposed. Fusion of the nuclei occurred, and also of the protoplasm. The organism then became elliptical and formed a double contoured membrane on its surface. Nuclear division and protoplasmic segmentation proceeded within the cyst, which ultimately contained 6 or 8 units. In the cultures, active forms were thought to be microgametes, while immobile or less active ones were designated macrogametes. Work on the organism is still in progress, in order to elucidate the complete cycle.

A. P.

MCCULLOCH (Irene). **An Outline of the Morphology and Life History of *Criethidia leptocoridis*, sp. nov.**—*Univ. California Publicat. Zool.* 1915. Sept. 16. Vol. 16. No. 1. pp. 1-22. With 4 plates & 1 text-fig.

Large numbers of flagellates were discovered in the intestinal tract of the box-elder bug, *Leptocoris trivittatus*, common about the buildings of the University of Kansas. The hosts can be easily obtained throughout the year, and the mature insects show a hundred per cent. infection.

The morphology of the flagellate form is of the usual crithidial type. An axostyle passing from the basal granule to the posterior end of the body, is considered to be present, as is also a rhizoplast. The "kinetonucleus" is also considered to consist of two large granules side by side, though "at still another angle the "kinetonucleus" may present the appearance of a single round chromatin mass." Longitudinal division has been observed. Observations of living material shows that in division of the flagellum a process of splitting occurs rather than a new outgrowth, and stained preparations go to confirm this.

Two types of preflagellate forms are described, a non-flagellate form enclosed in a capsule-like structure, and a flagellated form which develops from small round spores. The non-flagellate form shows no axostyle. Non-flagellate forms in juxta-position to flagellate forms have been observed. "Following the appearance of the preflagellate forms just described, there are great masses of *Leishmania*-like forms found in the lumen of the stomach. The evidence points to the fact that the flagellates described above undergo a multiple fission process, either intracellular or extracellular. Direct evidence of the intracellular forms has not yet been found in sections of the epithelial lining of the stomach but the so-called tailed and tailless spheres (Minchin and Thomson, 1915) have been found in cellular masses on smear preparations." Plasmodial masses and multiple fission forms also have been seen.

Flagellate forms vary in length from 20μ to 40μ and from 1.5μ to 3μ in breadth. Extremely long forms have been found in the ileum and colon. The post-flagellate stages have been found in the rectal region. "As the insects become mature the rectum is apt to be lined with attached flagellates and the lumen filled with a different type of the parasites, the free forms." The latter present much morphological variation.

The exact conditions under which the insects become infected are not definitely known. Under laboratory conditions, some very hungry insects were seen to suck the contents from the digestive tracts of other weaker ones. No hereditary infection was found. The infected regions of the bug were the stomach, mid-intestine, ileum, colon and rectum. The rest of the organs gave negative results.

A. P.

MIGONE (L. E.). **Un nouveau flagellé des plantes: *Leptomonas Elmassiani*.**—*Bull. Soc. Path. Exot.* 1916. June. Vol. 9. No. 6. pp. 356-359.

The author investigated the new flagellate when on an excursion along the banks of the Rio Salado, near Assomption, dealing with an outbreak of "Mal de Caderas" among the capybara.

The flagellate was found in the sap of a member of the *Asclepiadaceae*, *Araujia angustifolia*. All parts of the plant, stem, climbing branches, leaves, flowers and fruit contained the organism. The parasites did not disappear during the winter, when the plant was bare. When the parasitised plants were transplanted to another locality, they grew well, but gradually lost their parasites. Plants grown from the seeds of an infected plant were not infected. When

the stem or leaf of the plant is broken, a disagreeable odour is given out, and no animal has been seen to touch it nor insect to live on this plant.

The parasite is very fragile. Heat was found to be the best fixative. Giemsa stain was chiefly used. A nucleus and blepharoplast were present; the flagellum stained better with aniline gentian violet than with Giemsa. No undulating membrane was seen. The parasite divides longitudinally. The length of the body is 14μ to 15μ and the breadth 1.5μ to 2μ .

Inoculations of the parasites to animals have so far failed, as the animals have succumbed to septicaemia due to other causes. As the organism is shorter than that described by LAFONT, and occurs in a member of the Asclepiadaceae, it is named *Leptomonas elmassiani*.

A. P.

BRUG (S. L.). *Morphologische Studien an Proteosoma praecox*.—*Arch. f. Schiffs- u. Trop.-Hyg.* 1916. Vol. 20. pp. 289–306. With 2 coloured plates.

The author gives an account of the morphology and life-cycle of *Proteosoma praecox*, which he studied in canaries. The work was undertaken with a view to confirming HARTMANN'S inclusion of the *Proteosoma* in the group *Binucleata* [now abandoned]. In most respects, the morphology of the parasite described is of the usual type, but the author considers that he has demonstrated a blepharoplast in the young schizont, the structures being compared shortly with the parasite of kala azar. They have not been found with certainty in the half-grown or older schizonts, sexual forms, ookinetes or sporozoites. Figures in illustration of the binucleate condition are included on the plate [but the author does not seem to have excluded the possibility of a natural infection of herpetomonads co-existing with the *Proteosoma*].

A. P.

de MELLO (Froilano). *Quelques considérations sur les affinités zoologiques du genre "Haemocystidium," avec description d'une espèce nouvelle*.—*Anais Scientif. da Faculdade de Med. do Porto*. 1916. Vol. 3. No. 1. 11 pp. With 1 coloured plate.

The present paper commences with a brief review of the discovery of the parasites named *Haemocystidium* by CASTELLANI. The author quotes the opinion expressed in his textbook by MINCHIN that the genus was provisional. The author and his students bring forward some observations that they believe to show that the organisms known as *Haemocystidium* are really members of the group *Haemoproteus*, and that the two organisms belong to the same type of *Haemocytozoa*.

The main new feature of the work is the observation of the flagellate stage in the male gamete of *Haemocystidium* in the blood of lizards. A description is given of a new species of *Haemocystidium* in the blood of the lizard *Hemidactylus brookei* Gray. The animals were heavily infected. The red cells were hypertrophied if infected, were to some extent dehaemoglobinised, the nucleus was displaced, and as the parasite developed, it gradually

disappeared by a process of karyolysis. The male gametocyte has a nucleus showing three clear chromatic granules as a rule. Blackish brown pigment is present. The pigment is contained in one, rarely two, vacuoles. Flagellate male gametes have been observed but no details are given.

The female gamete has much pigment composed of numerous granulations, scattered over the entire surface.

Young forms are circular and possess no pigment.

The plate shows the forms of the gametocytes, but it is to be regretted that no figures of the male gametes, on which the new classification at present is founded, are given.

A. P.

de MELLO (Froilano) & BRAZ de SA (L. J.).—A Contribution to the study of Haemoprotezoa in Portuguese India.—*Indian Jl. Med. Res.* 1916. Apr. Vol. 3. No. 4. pp. 731-737. With 1 coloured plate.

The authors, writing from Goa, refer to the accounts given in various textbooks of the life-cycle of the Halteridia as given by SCHAUDINN, and to the old controversy as to whether Halteridia were part of the life cycle of trypanosomes. They have studied the Halteridium of the pigeon, and find no flagellate stage in its development. Their results confirm fully those of ACTON and KNOWLES, except in minor details, such as the further disintegration of the chromatin masses in nuclear division. In schizogony, the merozoites occur in the erythrocytes as small irregular bodies. When full grown, the schizonts are about a quarter the size of the erythrocyte. Small brownish-yellow granules of pigment are present. The parasite becomes free in the plasma, loses its pigment and becomes circular. The authors name this form the Acton body. Multiple division of the nucleus occurs, and ultimately all the nuclei become chromidial dust. The Acton body is then renamed the merozoblast, as it gives rise directly to merozoites. Gametogeny is like that described by ACTON and KNOWLES.

Haemoproteus moruony, n. sp., is described from the blood of a bird, *Copsychus saularis*, the poetic common name for which is "moruony." The cycle in the bird is like that in *H. columbae*, but all stages of its development may be found in the circulating blood of its host. Seventeen birds were examined and all were infected. No biting fly or arthropod was found on the birds.

Eleven specimens of *Vespertilio muricola* have also been examined. Two were infected with Plasmodia. Young bacillary forms of the parasite occurred in the blood. In schizogony, the chromatin divided early, and six merozoites were constantly produced. The gametocytes were circular or ovoid. All the bats had ectoparasites belonging to the Nycterobiidae, but nothing was found when these wingless Diptera were dissected.

The authors had not access to much of the literature relating to Plasmodia in bats, but should the Plasmodium of *Vespertilio muricola* prove to be a new species, they suggest the name *P. mackiei* for it.

[It is to be regretted that the authors have introduced new terms which are not needed in describing the trophozoite and schizont of a Haemoproteus.]

A. P.

PLIMMER (H. G.). **Notes on the Genus Toxoplasma, with a Description of Three New Species.**—*Proc. Roy. Soc.* 1916. Aug. Vol. B. 89. No. B. 616. pp. 291–296. With 2 plates.

The present paper contains a short historical survey of the genus *Toxoplasma*, with notes on new unnamed species. The author considers that the *Toxoplasms* are more nearly allied to the *Haemogregarines* than to other *Haemosporidia*. They may occur in mononuclear leucocytes or free. They produce marked wasting and considerable blood destruction. The organisms are not encapsuled. They possess a karyosomatic nucleus, which may become granular.

Toxoplasms are now described from the fossa, *Cryptoprocta ferox* from Madagascar, the host dying at the Zoological Gardens, London. The fossa was very emaciated, the kidneys and lungs were congested, while the blood contained poikilocytes and nucleated erythrocytes. A few *Toxoplasma* were present in the blood, many were present in the lung blood, pleural and peritoneal exudate and bone marrow, the latter containing schizonts.

The blue-tailed fruit pigeon, *Carpophaga concinna*, from the Aru Islands, contained large numbers of *toxoplasms* in the blood and lung exudate. The nucleus of the parasite was "generally single and definite, and was not broken up into granules."

Say's snake, *Coluber melanoleucus*, from Mexico, was very wasted and anaemic when examined. *Toxoplasms* were present in small numbers in the lung exudate, and in enormous numbers in the liver.

Toxoplasms have also been found in a Pied Bush Chat, *Pratincola caprata*, early stages of schizogony being found in the large endothelial cells of the lungs.

Two plates of somewhat poor and unconvincing figures illustrate the paper.

A. P.

CARINI (A.) & MIGLIANO (L.). **Sur un Toxoplasme du cobaye (*Toxoplasma caviae*, n. sp.).**—*Bull. Soc. Path. Exot.* 1916. July. Vol. 9. No. 7. pp. 435–436.

The authors, writing from Sao Paulo, Brazil, have found a spontaneous infection of *Toxoplasma* in a young guinea-pig, four weeks old, the infection having fatal results. Prior to death there were no symptoms noted. At autopsy, the spleen was found to be three to four times the normal size, friable and somewhat harder than usual. The liver was enlarged and hyperaemic, the lungs congested and the intestine red, with engorged blood vessels. Smears were made of all organs, and *toxoplasms* were found therein. They were 5μ to 8μ by 2μ to 4μ . Slightly curved, pyriform and oval forms were usual. The parasites were usually free, occasionally endocellular. Some multiplicative forms were present.

Two pigeons were inoculated subcutaneously with emulsions of organs of the guinea-pig. Both died after 17 days, but until the fifteenth day no symptoms were noticed. For the last three days, the birds showed great thirst, had no appetite, had diarrhoea, and were

very ill on the last day. At autopsy, the lungs showed numerous grey spots, the liver was enlarged and hyperaemic, and numerous parasites were found in the lung and in the liver.

The name *Toxoplasma caviae* is given provisionally to this parasite, though the authors express the opinion that probably the organism may be found to be identical with that in the dog and rabbit.

A. P.

van SACEGHEM (R.). **Observations sur des infections naturelles par *Toxoplasma cuniculi*.**—*Bull. Soc. Path. Exot.* 1916. July. Vol. 9. No. 7. pp. 432-434. With 1 fig.

Natural infection of rabbits born at Zambi, Lower Congo, has been observed by the author. The rabbits were 2½ to 3 months old, and only young rabbits were in the hutch. The infection was always fatal. Profound anaemia, with white conjunctiva, was usual. The rabbits fed badly and did not move about. Paresis of the limbs followed and death ensued. The spleen was hypertrophied, 10 cm. long and 2 cm. broad, sprinkled with white spots and ecchymoses. The liver and the lungs were similarly spotted. At first sight, the appearance suggested miliary tubercle. The blood showed basophilia and lymphocytosis. No parasite other than *Toxoplasma* was found in the peripheral circulation.

Characteristic *Toxoplasma cuniculi* was found in the spleen smears. Some more or less rounded forms were also noted. The average length of the parasites was 6μ to 7μ. Some dividing forms measured as much as 21μ. The position of the nucleus was very variable. Sometimes the nucleus contained many chromatic masses. One or two very distinct chromatic masses were seen in some, and the author suggests that these may be micronuclei.

The parasites were found in many large mononuclear leucocytes in the spleen, where schizogonic forms were also found. Young merozoites were set at liberty by the rupture of the large mononuclears, and the parasites in such cells are therefore considered to be usually schizonts.

A. P.

CRAWLEY (Howard). **The Sexual Evolution of *Sarcocystis muris*.**—*Proc. Acad. Nat. Sci. Philadelphia.* 1916. Jan. pp. 1-43. With 5 plates.

This paper should be consulted in the original by those interested in the subject. It is impossible to give a detailed analysis of it, and perhaps the best plan is to reproduce the author's summary, which is as follows:—

"(1) The spores of *Sarcocystis muris*, ingested by a mouse, may reach the posterior part of the small intestine within one hour.

"(2) Invasion of the epithelium cells of the intestine may also take place within the same time.

"(3) Upon reaching the lumen of the intestine, the spore rapidly undergoes changes. The nucleus becomes larger and more conspicuous, and a distinct nuclear net becomes evident. The granules characteristic of the spore as it occurs in the cyst either disappear or become much less evident. Further changes, however, do not take place unless the spore gains an intracellular situation.

"(4) The spores are sexually differentiated, but it does not appear to be possible, at the outset, to distinguish between the males and females.

"(5) Within the mouse cells the changes undergone by the males, or microgametocytes, begin to be evident at the end of $1\frac{1}{2}$ to 2 hours.

"(6) These changes are, first, a further increase in the size of the nucleus accompanied by a further development of the nuclear net, and, second, degeneration and ultimate disappearance of the cytoplasm. The cell contours become rough and irregular, vacuolization occurs, the cytoplasm becomes reduced to two masses of debris lying at the ends of the nucleus. These finally disappear, the entire process usually being completed at the end of six hours. The micro-gametocyte is thus reduced to its original nucleus, which, however, is of approximately the same size as the original spore.

"(7) Conspicuous internal changes next take place, which modify both the morphology and chemistry of the parasite. They may be considered under three headings, but they all take place more or less simultaneously.

"(a) The chromatin appears to suffer a loss in actual bulk, but alters in staining reaction from acidophil to basophil.

"(b) From occurring in large irregular masses or distributed along the threads of the linin net in strips of bands, the chromatin is reduced to granules which become progressively smaller and smaller and at the same time display a greater and greater affinity for chromatin stains.

"(c) These granules finally assemble in clusters around the periphery of the organism.

"(8) The next step is the solidification of these granular clusters into rounded, solid balls. These balls next elongate and become minute, thread-like bodies, which are the microgametes. This stage may be found in mice killed from 9 to 18 hours after inoculation. It is very rare in the shorter of these two periods, but has apparently passed its acme at the end of 18 hours.

"(9) The females go through with their development side by side with the males, but there are no such conspicuous changes and the early female stages are much like the spore which has just entered the cell.

"(10) In the course of a few hours, however, the females can be picked out, appearing as broadly oval cells, relatively shorter and broader than the original spores. The cytoplasm is all retained and assumes a rather dense alveolar texture. The nucleus shows no evident increase in size. The nuclear net does not develop as it does in the male parasite, but the chromatin concentrates into a single large karyosome which maintains an acidophil rather than a basophil staining reaction.

"(11) In the 6- to 15-hour periods, phenomena are seen which seem best interpreted by regarding them as maturation. Irregular chromatin granules appear in close association with the nuclear membrane. Later these granules pass out into the cytoplasm, and finally disappear.

"(12) The mature female, or macrogamete, may be found in mice killed from 11 to 18 hours after inoculation.

"(13) Finally, in the 18-hour stages, macrogametes may be found which in some cases show minute, thread-like bodies upon their surfaces, and in others contain within their substances small solid chromatic bodies, one in each case. These appearances are regarded as warranting the interpretation that fertilization takes place."

A. P.

CRAWLEY (Howard). **The Zoological Position of the Sarcosporidia.**—*Proc. Acad. Nat. Sci. Philadelphia*. 1916. June. pp. 379-388.

The author has previously shown that the spores of *Sarcocystis muris* are sexually differentiated and that the sexes develop in the intestinal cells of the mouse, fertilisation occurring in from 9 to 18 hours after ingestion. The events following on fertilisation have not been traced. He reviews the work of ERDMANN and of NÈGRE, the experiments of the latter worker in infecting animals by means of sarcosporidian

spores in faeces having been repeated and confirmed in America. The work of NEGRI and BERTRAM is also discussed, and the author mentions that FANTHAM found two types of spores in *Sarcocystis coli*. He then reviews the classification of the Sarcosporidia among the Sporozoa, in connection with his discovery of sexual forms. He considers that the earliest stages of the sarcocysts as depicted by BERTRAM and NEGRI may be only sporoblasts. The sarcosporidian cysts is said to be derived from a single cell, such having been found in the heart cells of a sheep infected with *S. tenella*. The several stages of *Sarcocystis muris* are compared with those of "an ideal member of the Coccidiomorpha." It is considered that the evolution of the microgametes and the macrogametes of the organisms compared are parallel. The events following on fertilisation in the Sarcosporidia are as yet unknown. A product of the zygote, however, invades the muscles of the host, and also probably develops into the cysts. If such is the case, the parallel holds. The end-results of the development in the muscles is the same, since a large number of potential sexual forms are evolved.

It is considered that the sarcosporidian spore is the homologue of the coccidiomorphan merozoite; the sexual stages are alike, while the sarcosporidian sporoblast may correspond to either the sporozoite or the trophozoite of the Coccidiomorpha. From the foregoing considerations, the author concludes that the Sarcosporidia are not members of the Neosporidia, but belong to the Telosporidia, and to the Coccidiomorpha. He adds an interesting speculation as to the probability of the Sarcosporidia having two hosts, and suggests that a carnivorous animal becomes infected by eating a parasitised herbivorous one, while the herbivorous host becomes infected by ingesting spores voided with the faeces of the infected carnivore.

A. P.

FRANCO (ENRICO E.) & BORGES (I.). *Sur la sarcosporidiose bovine.*—*Arq. Inst. Bact. Camera Pestana*. 1916. Vol. 4. No. 3. pp. 269–289. With 11 plates.

The sanitary inspectors at the municipal abattoir at Lisbon, have long recognised a malady affecting cattle, especially oxen, in the province of Alentejo. Cattle so affected were unfit for food. Since 1885, 67 out of 339,636 oxen were condemned on account of sarcosporidiosis. The present authors have worked on the subject since 1912. They have studied six cases. The material used consisted in five cases of pieces of aponeuroses, and in the sixth, in addition, two large bands of skin, one from the head and the other from the thigh were used.

Macroscopically, the lesion consisted in little spherical grains, about 0.25 mm. to 0.4 mm., found especially in superficial aponeuroses and, more discretely, in the subcutaneous tissue. The grains were yellowish white, and suggestive of sand. Sometimes the nodules were so abundant that a large granular mass was formed. In generalised infections, they occurred on all parts of the head, body, trunk and limbs. The greatest number were found on the thighs and flanks. The malady is believed to be due to the organism that was named *Sarcocystis besnoiti* by MAROTEL. The gross external symptoms have not been so marked as in the cases of the earlier investigator, but it is

possible that the malady had not reached its last stage when it came under the observation of the present workers. All the animals were thin, but no external signs that they were infected could be detected in the living animal.

Macroscopically, the size of the cysts varied from 250μ to 400μ . Nearly all the granulations possessed a central clear space in them. The granular part was surrounded by a clear part. Microscopically, there were three parts to each cyst, an external membrane, an internal, cellular membrane, and spores. The external membrane was of uniform thickness in each cyst, but differed in thickness for different cysts. It was structureless. The internal membranes consisted of a continuous protoplasmic layer, finely reticulate, with numerous nuclei, resembling endothelium. Spores are only found within the cysts, and can only be set free by crushing the cysts. In the fresh condition, the spores (sporozoites) show no flagella. They move slowly by contraction and flexion. The extremities were rounded, and one end was always more rounded than the other. The majority were banana-like. The average dimensions were 4.5μ to 6.5μ long, by 1μ to 1.8μ broad.

The pericystic tissue consisted of connective tissue cells, eosinophile leucocytes, and plasmatic cells (plasma cells, plasmocytes, and hypercyto-chromoplasmatic elements).

Examination of the skin macroscopically shows little. There was no desquamation, the hairs were normal, there were no ulcerations. In the thickness of the skin numerous very small, translucent granulations were found. The muscles immediately beneath the spots also had some of the granulations. The cysts were found, when examined histologically, to be present in the dermis, in the adjacent subcutaneous tissue, and in fewer numbers in the adjacent muscles. They were not present in the epidermis.

Evidence of cure was the same in all the cases. Sometimes capsules were found torn and partly filled with new connective tissue. In others, the contents had become fused into a homogenous block in which only a few remains of spore nuclei could be distinguished. The authors have never seen any evidence of phagocytosis of the spores. They find rupture of the external capsule with total or partial destruction of the internal capsule, and subsequent infiltration of cellular elements into the capsule.

Attempts to transmit the affection to rats and mice by the mouth and by subcutaneous inoculation have been negative. The origin of the malady also is unknown.

As the parasites presents certain features different from other species of *Sarcocystis*, the authors create a new genus for it, naming the organism *Besnoitia besnoitia*.

A. P.

AMOEBIASIS AND DYSENTERY.

AMOEBIASIS.

THOMSON (David) & THOMSON (J. Gordon). **Protozoological Researches, including Investigations on the Sand in Egypt, undertaken to elucidate the Mode of Spread of Amoebic Dysentery and the Flagellate Diarrhoeas: with Conclusions regarding the Sanitary Measures necessary to prevent these Diseases.**—*Jl. Roy. Army Med. Corps.* 1916. July. Vol. 27. No. 1. pp. 1-30. With 3 plates.

Part of the present paper covers the same ground as certain of the earlier works of these authors, working alone or in collaboration [see this *Bulletin*, Vol. 8, 115]. It is therefore not necessary to cover this ground again. The vast majority of the Protozoa found in the sand of Egypt are considered by the authors to be harmless. A large part of the memoir deals with the morphology and life-history of *Amoeba limax*. It was studied on cultures on agar that had flowed over a slide, the whole slide being fixed and stained. In agar cultures, the cysts were found at the centre and the vegetative forms ultimately at the edge of the growth. There is a discussion as to whether sporogony occurs within the cysts of *A. limax*, the conclusion apparently being that it is doubtful whether sporogony or autogamy occurs.

A Bodo and a Prowazekia occurred in the sand and also at times have been found in human faeces and in horse dung. *Amoeba proteus*, *A. verrucosa* and *A. diploidea* were found. *Astasia margaritifera*, a flagellate belonging to the Euglenoidina, occurred, and some *Scenedesmus caudatus* and *Pandorina merina* also were observed, the latter being freshwater algae.

Ciliates described as "balantidium or nyctotherus" were also present. Free and encysted forms occurred, and the cysts gave rise to four daughter forms.

By experiments it was shown that the cysts of the Protozoa found were very resistant to external agencies such as heat, sunlight and water. They were also resistant to chloride of lime in much larger quantities than are used in water sterilisation.

The paper concludes with a short, very practical resumé of the sanitary measures necessary for the prevention of amoebic dysentery and the flagellate diarrhoeas [see this *Bulletin*, Vol. 8, pp. 115-116].

A. Porter.

CANNATA (S.). **Sulla dissenteria amebica nell' infanzia.** [Amoebic Dysentery in Infancy.]—*Pediatrics* 1916. June. Vol. 24. No. 6. pp. 359-362.

An article drawing attention to the possible occurrence of amoebic dysentery in children of tender years, in places where it is endemic. OLINTO de OLIVEIRA met with 100 cases in children between 2 and 15 years of age out of 6,000 examined in Brazil (in 1906), while BOBILLIER in France has recorded cases in infants between 8 and 23 months of age [reference not given]. The dose of emetin given by the latter is one centigramme twice daily for children between one and two years of age, and half that quantity for infants under one year.

J. B. Nias.

RAVAUT (P.) & KROLUNITSKI (G.). *Les kystes amibiens. Importance de leur recherche dans le diagnostic et la pathogénie de la dysenterie amibienne.*—*Presse Méd.* 1916. July 3. Vol. 24. No. 37. pp. 289–291. With 2 text figs.

Active entamoebae are only found for a short period during the acute attack and occasionally between the crises. As they soon perish the examination must be done in close proximity to the bedside. It is the detection of the cysts of *E. histolytica* with which we have to deal most frequently. If they are very scanty a saline purge, a purgative wash or, best of all, an intravenous injection of 1–4 cgm. of mercury cyanide will increase their numbers. The cysts will remain in a good state of preservation for at least two days in the stools. The authors have found that by the addition of formalin to faeces containing them the cysts will retain their characteristic microscopic appearance intact for an indefinite length of time. This is very useful if the faeces have to be sent long distances for investigation or if it is expedient to postpone the search for cysts. Amoebic dysentery has suddenly become an important disease in France as a result of the war. Cysts have been discovered by the authors in 5 per cent. of apparently healthy individuals in one district in France, compared with 8 per cent. found by MATHIS in an endemic area in the colonies. In addition a number of cases of acute amoebic dysentery have occurred in people who have never been out of France; the detection of cysts with a view to the treatment or isolation of carriers is, therefore, of paramount importance. The authors discourse upon the morphology of *E. histolytica* and other organisms with which it may be confounded. The accompanying figures have been drawn to illustrate the salient points of difference.*

E. E. Atkin.

RAVAUT (Paul) & KROLUNITSKY (Georges). *Sur quelques formes cliniques de dysenterie amibienne autochtone observées au cours de la petite épidémie de la région du Nord.*—*Bull. et Mém. Soc. Méd. des Hôpit. de Paris.* 1916. June 9. Vol. 32. 3 ser. No. 19–20. pp. 916–926.

This is an attempt to class amoebic dysentery under three artificial headings.

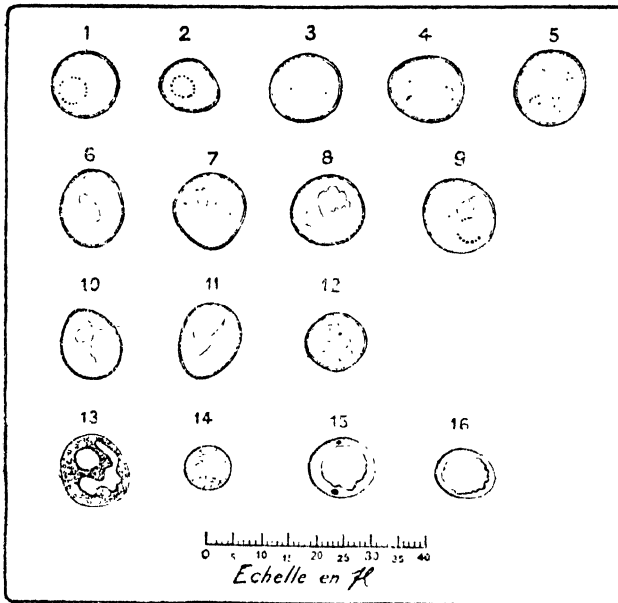
Septicaemic type.—Three cases are cited.

(a) A soldier, 39 years old, developed dysentery after inhabiting trenches previously occupied by colonial troops. Emetin and anti-dysentery serum did no good. The patient's serum gave a slight agglutination at 1 : 50 dilution with Flexner-Y bacillus. [This is too low a dilution to be diagnostic.] Petechiae and a purpuric rash made their appearances, in addition to which several haemorrhagic abscesses formed which were sterile on cultivation. Amoebae were not found in the faeces, but the man had been having silver nitrate washes. This case proved fatal and the autopsy confirmed the diagnosis.

(b) In another case *B. dysenteriae* Shiga was found in the stools. Antiserum however failed to relieve the condition and a further search revealed the presence of amoebae. Emetin and salvarsan seemed to do good but the cachexia continued. Eventually the patient succumbed three months after admission to hospital.

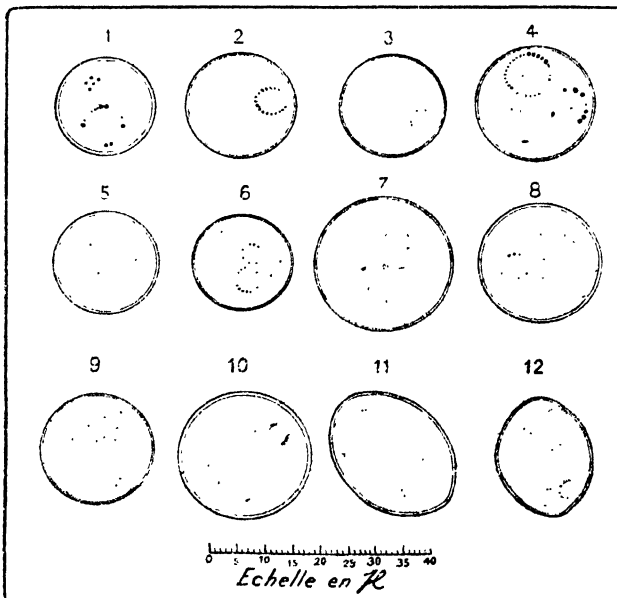
* Reproduced by permission of the Editor of *La Presse Médicale*.

PLATE 1.



- 1—9. Cysts of *E. histolytica*.
 1—5. Cysts with one to four nuclei.
 6—9. Cysts enclosing chromidial masses.
 10—12, 1 Cysts of *Lamblia intestinalis*.
 13 & 14. White and red cells.
 15 & 16. *Blastocystis hominis*.

PLATE 2.



- 1—12. Cysts of *E. coli* with one to eight nuclei.

In addition to the intestinal lesions, the suprarenals were affected. The medulla could no longer be distinguished, and the cortex was softened.

(c) In this case Shiga and *E. histolytica* cysts were both found in the stools. Anti-dysentery serum was without effect, but salvarsan quickly cured the patient, which is in accordance with the now established fact that when the two organisms are associated the amoeba assumes the chief rôle.

All these cases appeared to belong to a septicaemic type, the chief features of which are, fever, hiccough, vomiting, dysenteric stools, cutaneous haemorrhages and sanious abscesses. The septicaemic condition is put down to some secondary invader at present unknown.

Suprarenal type.—As an illustration of this a case is cited of a man who had spent eight months in Tunis where he was quite healthy. He was sent to the Belgian front and developed dysentery. He exhibited all the signs of suprarenal failure—low vascular tension, etc. A litre of serum containing 2 mgm. adrenalin was introduced into a vein, which was repeated next day. On the third and fourth days only half the amount of serum in conjunction with 2 mgm. of adrenalin was given. Subsequently immobile amoebae containing red blood cells, in process of forming cysts were discovered. Emetine and salvarsan effected a cure.

Obscure cases.—Under this heading are classed the cases which are clinically much more indefinite. They are often associated with the cystic stage of the amoeba.

[The authors consider they have established for the first time that amoebae can cause lesions of the suprarenal glands. There is absolutely no proof of this here. In the writer's opinion it is much more reasonable to suppose that *B. dysenteriae* Shiga is the real cause. On the authors' own showing (see previous summaries) this organism is frequently associated with *E. histolytica* and it is known to form a toxin which attacks suprarenal tissue. No effort was even made to exclude the Shiga bacillus.]

E. E. A.

BATES (John Pelham). *The Treatment of Amebic Dysentery.*—*Jl. Amer. Med. Assoc.* 1916. July 29. Vol. 67. No. 5. pp. 345-347.

The author is of the opinion that a permanent cure of amoebic dysentery ought to be possible in practically all cases, if the ipecac treatment is supplemented by other treatment calculated to aid its amoebicidal action and hasten the healing of the ulcers.

The treatment consists in the administration of bismuth subnitrate in large doses after the course of ipecac or emetine is over. [cf. DEEKS. This *Bulletin*, Vol. 4, p. 319.] Enemas of normal saline, two to three quarts at a time, are given from the beginning. The patient must be entirely at rest and a milk diet given in the acute stage. The aim is to carry out this treatment until one is reasonably sure that all the ulcers are healed.

A relatively large portion of the article is theoretical.

E. E. A.

DALE (H. H.). **Treatment of Carriers of Amoebic Dysentery. Note on the Use of the Double Iodide of Emetine and Bismuth.**—*Lancet*. 1916. July 29. pp. 183-184: and *Jl. Roy. Army Med. Corps*. 1916. Aug. Vol. 27. No. 2. pp. 241-244.

Although of great use in amoebic dysentery, emetine does not free every case from the cysts of *E. histolytica*. It is uncertain whether the cyst-producing entamoebae in these chronic cyst carriers are living free in the intestinal contents or are lodged in some partly healed sinus. In favour of the latter supposition is the fact that liver abscess may occur without acute dysentery. In either case the failure of the hypodermic injections of emetine could be explained by the entamoebae being shut off from the tissue fluids. The alleged superior efficacy of ipecacuanha by the mouth in these cases may also be accounted for on this assumption. The author has been giving a drug a trial, which combines the virtues of the emetine and ipecacuanha treatments. This is the double iodide of emetine and bismuth, suggested by DU MEZ last year.* It is given by the mouth, and being insoluble in dilute acid it passes the stomach and becomes gradually decomposed with the liberation of emetine and precipitation of bismuth sulphide in the intestine. It has been tried clinically on 10 cases, in all of which cysts had returned after full treatment with hypodermic emetine. They all appeared to be cured except two, one of which relapsed after two full courses of the drug while the other could not tolerate it on account of the vomiting and diarrhoea which it caused. The best way of avoiding these troublesome complications was by administration just after a full meal. A good average daily dose is 3 grains in capsules, representing 1 grain of emetine hydrochloride, and 12 such doses may be given in succession.

E. E. A.

LOW (George C.) & DOBELL (Clifford). **Three Cases of *Entamoeba histolytica* Infection treated with Emetine Bismuth Iodide.**—*Lancet*. 1916. Aug. 19. pp. 319-321.

This is a report on three cases of infection with *E. histolytica*. The first case was one of acute dysentery in which the stools were freed from entamoebae by the new preparation of emetine. It is of course too early to say whether a permanent cure was effected. The second case was a cyst carrier, the original infection dating from seven years back. He had received small doses of emetine under the skin from time to time. The double iodide by the mouth quickly caused the cysts to disappear. A proper course of hypodermic emetine, however, might have had the same result. The third case was also a cyst carrier who responded readily to the drug and has remained free for six weeks.

The administration of this new preparation is accompanied by considerably more disagreeable symptoms than are experienced with the ordinary hypodermic course of emetine. Vomiting is fairly common, while some of the patients are purged.

E. E. A.

* See this *Bulletin*, Vol. 7, p. 446.

KILGORE (A. R.). **Peripheral Neuritis following Emetin Treatment of Amoebic Dysentery.**—*Boston Med. & Surg. Jl.* 1916. Sept. 14. Vol. 175. No. 11. pp. 380-382.

Several cases of peripheral neuritis after treatment with emetin have been met with. The trouble usually manifests itself in general muscular pain or weakness especially in the legs, going on sometimes to paresis. Wrist and toe drop are common. The accompanying table shows the amounts of emetin, given in varying doses daily, which have been associated with neuritis. Some of the doses were given intravenously.

Grains.			
1. Adult	19.5	Severe neuritis.	
2. „	6	„ „	
3. „	21.3	mild „	
4. „	12.8	moderate „	
5. „ about	10	mild „	
6. „	15	moderate „	
7. Age 8	6	mild „	
8. „ 7	5.5	„ „	
9. „ 5	4	„ „	
10. „ 4	4	„ „	

The symptoms disappear gradually on stopping the administration of emetin. Some experiments now in progress suggest that peripheral neuritis may be produced in dogs by emetin.

E. E. A.

RAVAUT (Paul) & KROLUNITZKY (Georges). **L'emploi du novarsénobenzol dans le traitement de la dysenterie amibienne.**—*Bull. Soc. Path. Exot.* 1916. July. Vol. 9. No. 7. pp. 510-522.

Not being entirely satisfied with the results of emetine treatment in amoebic dysentery, the authors have been trying the effect of novarsénobenzol (salvarsan). An intravenous injection of 0.3-0.45 gm. was given in the acute stage with very beneficial results. The arsenic in the drug had an additional tonic effect, increasing the appetite and making the patient able to tolerate a sustaining diet.

In the case of chronic dysentery where the *entamoeba* is passed in cystic form the treatment is more prolonged. An intravenous injection of 0.3 gm. was repeated every three days until 10 injections had been given. Although the general condition was much improved the cysts disappeared from not more than one half of the cases. Better results attended the oral administration in gelatine capsules. Two capsules each containing 0.05 gm. were given daily for 10 days. The cysts almost always disappear from the faeces but whether permanently, is not yet certain.

Two complications of amoebic dysentery, namely intestinal haemorrhage and painful enlargement of the liver were successfully treated with novarsénobenzol.

E. E. A.

RISQUEZ (Jesús Rafael). **Una complicación poco frecuente del absceso hepático.** [An Unusual Complication of Liver Abscess.]—*Gaceta Med. de Caracas*. 1916. Aug. 31. Vol 23. No. 16. pp. 121-123

A case of liver abscess which proved fatal by rupture into the inferior vena cava. The patient was a man, aged 52, who entered hospital with all the symptoms of a liver abscess. This was tapped with a trocar and about a litre of pus was drawn off, 100 cc. of a 1 per mille solution of hydrochlorate of emetin being then injected into the cavity. The patient sank rapidly after the operation, and died on the following day. Post-mortem it was found that the abscess cavity occupied the upper and posterior portion of the right lobe of the liver, so that it was brought into contact with the vena cava, which traversed its posterior wall. On being slit up, the vein was found to be discoloured interiorly, with clots adhering to the lining membrane. It communicated with the interior of the abscess by a track formed by one of the supra-hepatic veins, whose walls were softened and the lumen filled with clot. According to RENDU, out of a total of 563 cases of rupture of liver abscess into the different viscera and visceral cavities, rupture into the vena cava only occurred three times.

J. B. N.

CAMERON (Donald A.). **A Case of Liver Abscess.**—*Med. Jl. of Australia*. 1916. May 27. Vol 1. 3rd Year. No. 22. pp. 432-434. With 1 chart.

An account of a case of liver abscess in the Australian auxiliary hospital at Harefield. The soldier had spent 13 weeks at Gallipoli but had not had dysentery there; he had in fact been constipated. There was no history of jaundice. An abscess developed which was opened through the pleural cavity. Two pints of chocolate-coloured pus were evacuated in which amoebae were demonstrated. No attempt to shut off the pleural cavity was made. A large drainage tube was inserted and the patient was given $\frac{1}{2}$ gr. injections of emetine night and morning for about a fortnight. He made a good recovery.

E. E. A.

EICHHORN (Adolph) & GALLAGHER (Bernard). **Spontaneous Amebic Dysentery in Monkeys.**—*Jl. Infect. Dis.* 1916. Sept. Vol. 19. No. 3. pp. 395-407. With 6 text-figs.

Spontaneous amoebic dysentery in animals is very rare. A case complicated with liver abscess occurred in a badger in the zoological gardens at Cairo and in an orang-outang in Manila. Monkeys have several times been reported to have been infected. A disease called infectious enterohepatitis of turkeys is the only other disease in which an amoeba is known to be the cause.

In the present outbreak 8 monkeys died out of 15 exposed to infection, while of the 9 showing symptoms only one recovered. The actual species of amoeba concerned was not specially investigated. The organisms were numerous in the liver abscesses, but could also be readily found in the faeces, the encysted form being more numerous in the latter.

All the monkeys were of the same species, namely the spider monkey (*Ateles ater*). It is not known for certain which of them introduced the disease, so that the incubation period cannot be defined. With the object of determining the relationship of this disease to the amoebic dysentery of man an attempt was made to infect two cats and two kittens by mixing the faeces of the monkeys with their food, as it is known that these animals can be infected with the *E. histolytica* of man. The cats however did not take the disease and this is looked upon as a point in favour of the amoeba being a species distinct from that which affects man, although too much reliance must not be put upon this because such feeding experiments are by no means invariably successful.

The symptoms shown by the monkeys were first of all marked listlessness. The temperature remained about normal and the appetite was fairly good up to death. Severe diarrhoea set in. The faeces were fluid, yellowish-grey in colour, with a considerable amount of mucus and in the more acute cases also contained blood. Autopsies were performed in eight cases. The caecum and colon were the seats of ulceration which sometimes reached as far as the rectum, but the small intestine was never involved. Liver abscess was met with in the two cases which showed the most extensive intestinal lesions. In one case a single abscess was present, in the other seven. There was no well-defined capsule. As already mentioned active amoebae were demonstrated in the pus.

E. E. A.

WARE (F.). **The Possibility of Amoebic Dysentery in the Dog, and its Treatment with Emetin.**—*Jl. Comp. Path. & Therap.* 1916. June. Vol. 29. Pt. 2. pp. 126–130.

At Ootacamund, a hill station in the Madras Presidency, a pack of foxhounds was kept. They usually enjoyed good health, but for some years dysentery had been a source of trouble. An examination of the faeces revealed the fact that seven of their number were infected with amoebae which bore a striking resemblance to *E. histolytica*. All these hounds were treated with injections of emetin, the dose being $\frac{1}{2}$ grain of the hydrochloride (Burroughs Wellcome and Co.) at first, increased later to one grain which seemed to have a better effect on the dysentery. This is probably the maximum dose for any but a large hound, for it was apparently the cause of vomiting in two small bitches. In addition to the seven animals above mentioned, two others became affected with the disease soon afterwards. A point worth noting is that five out of the nine had been imported from England the same year. Seven of the animals were apparently cured by the treatment; only one had a relapse and this disappeared with further treatment. Of the remaining two one was drafted to another pack, his faeces being normal; the other died.

E. E. A.

MENDEL (Joseph). **Recherches sur les amibes dans la pyorrhée alveolaire et les autres stomatopathies.**—*Ann. Inst. Pasteur.* 1916. June. Vol. 30. No. 6. pp. 286–298. With 1 coloured plate.

A number of investigations have been carried out by the author on the amoebae of the mouth, the work being done in the laboratory of

Dr. SALIMBENI at the Institut Pasteur. The author describes the morphology of the amoebae observed in both fresh and stained preparations, but no new features are given. With regard to reproduction, though search was made of numerous preparations, clear examples of mitotic division have not been seen. Some forms that might be considered as cysts were observed, but the author reserves his opinion as to whether they were really cysts.

Amoebae were found in 38 out of 40 patients examined. The patients suffered from various maladies, but all had alveolo-dental pyorrhoea. Pyorrhoeal cases in which the secretion was small in quantity yielded more amoebae than those in which there was an abundant secretion. Amoebae were also found in the mouths of persons without pyorrhoea. Twenty-four out of 42 adults and 8 out of 36 children examined were infected. The size and the morphology of the amoebae were the same as in cases of pyorrhoea. In all cases where amoebae were present in large numbers, there was a modification of the gingival exudate, normal leucocytosis being replaced by more or less marked hyperleucocytosis.

Amoebae were also found in a case of chronic suppuration, where the pus had passed between the gum and the root, simulating true pyorrhoea. They were also observed in two soldiers suffering from exceptionally bad gingivo-stomatitis, and in a few other dental maladies.

Attempts at treatment by emetine of amoebae in pyorrhoea was disappointing, as all failed. The author considers that the presence of hyperleucocytosis of the gingival exudate is symptomatic of a certain predisposition to pyorrhoea alveolaris, and that the practice of a rational dental hygiene will do much to reduce the number of amoebae, if not to exclude them.

A. P.

BACILLARY DYSENTERY.

GABBI (Umberto) & VANZETTI (Ferruccio). **Sulla sindrome, anatomia patologica ed etiologia della dissenteria bacillare osservata nei prigionieri austriaci provenienti della Serbia, e raccolti all'Asinara.** [The Symptoms, Pathological Anatomy and Causative Agent of the Bacillary Dysentery observed in the Austrian Prisoners received from Serbia, and interned at Asinara.]—*Malaria e Malat. d. Paesi Caldi*. 1916. May-June. Vol. 7. No. 3. pp. 151-159.

The survivors of the prisoners taken by the Serbians from the Austrian army under General Potiorek, were sent, by arrangement with the Italian Government, to the Sardinian island of Asinara, because it was impossible to feed them at Nish. A considerable number of them died on the island from symptoms of a dysenteric character, and the present paper gives an account of the post-mortem findings in 13 of the cases. A characteristic ulceration of the colon was present in all, though in varying degrees of severity. The same micro-organism was isolated in every case and presented the form of a Gram-negative, non-motile bacillus, which formed bluish colonies on Drigalski's medium; it would not, however, agglutinate with serum obtained from other cases of dysentery. The serum of seven patients

was tested against standard strains of dysentery bacilli, and gave a positive result in four instances and a negative one in the remaining three, as shown in a table. Three of the positive sera reacted with *B. Flexner* in a dilution of 1 : 200, and the remaining one with a Shiga in a dilution of 1 : 50.

J. B. N.

NICOLLE (M.), DEBAINS (E.) & LOISEAU (G.). **Etudes sur le bacille de Shiga.**—*Ann. Inst. Pasteur.* 1916. Aug. Vol. 30. No. 8. pp. 363-382.

This paper in the main does not cover much new ground but the experiments have been carefully carried out. It will suffice to mention the more important points. The animals used were rabbits, guinea-pigs and mice. When *B. dysenteriae* Shiga is inoculated subcutaneously in a lethal dose, the organisms persist in the local lesion until death but do not become disseminated. Introduced into the veins they persist in the liver and sometimes in the bile until death. They could be detected in the blood for 24 hours. They were always absent from the faeces, caecal mucosa, kidneys, urine and spleen. When the dose introduced was sub-lethal, no bacilli could be recovered on killing the animal.

It required about 10 times the amount of bacilli to produce the same result subcutaneously as was obtained by the intravenous method. Heating for half an hour at 55° kills the bacilli, but they remain as toxic as before. Specially autolysed extracts and filtrates were prepared which possessed considerable toxicity.

A strain which was kept on artificial media for 13 years still retained its toxicity unimpaired; nor was it modified by cultivating for many generations at a relatively high temperature, 42°-47°.

Detailed accounts are given of autopsies on inoculated animals which are hardly of sufficient general interest to record.

As others have found, agglutinating sera furnished by rabbits are more specific than those obtained from horses. The latter always agglutinate *B. dysenteriae* Flexner more than *B. dysenteriae* Shiga, no matter whether living or dead Shiga bacilli, or extracts from the same, were used for the immunisation.

The antiserum prepared against living bacilli introduced either subcutaneously or intravenously. The antiserum possesses only moderate agglutinating power, while the agglutinating serum was weak in protective action. To prepare a good antiserum therefore, the extract which the authors employed to make their protective serum should be used for the inoculations, while for the production of an agglutinating serum it is better to use the bacilli themselves.

E. E. A.

SNIJEDERS (E. P.). **Over de beteekenis der agglutinatíe van dysenterie-stammen met menschersera.** [On the Value of Agglutination, with Human Serum, of Dysentery Bacilli.]—*Geneesk. Tijdschr. v. Nederl.-Indië.* 1916. Vol. 56. Pt. 2. pp. 105-137. With 1 plate.

The author sets himself in this paper to discuss the precise value of agglutination reactions with dysentery bacilli, for purposes of diagnosis.

He remarks that if we could by this means diagnose latent infections with certainty, the method would be a valuable one, but unfortunately this is not the case in his experience. A certain number of healthy individuals react with all the strains of dysentery bacilli commonly employed for the purpose, to an extent which seriously detracts from the value of the method as a diagnostic agent [see table on p. 120 for the results obtained with 21 Europeans, 19 Javanese, and 20 Chinamen]. Roughly 10 per cent. of the Europeans tested, 15 per cent. of Javanese, and 25 per cent. of the Chinamen reacted positively with *B. Shiga-Kruse* in a dilution of 1 : 100, and in an even higher proportion with *Bacillus Y* and *B. Y-Flexner* in the same strength. His general conclusion is that for diagnostic purposes nothing at present supersedes the microscopic and bacteriological examination of the stools; and he adds that even very small variations in the preparation of the emulsion, and of the diluting fluids employed, may lead to fallacious results.*

J. B. N.

KUHN (Philalethes). *Die Bedeutung der Paragglutination für die Diagnose des Typhus und der Ruhr.* [Significance of Para-Agglutination in the Diagnosis of Typhoid Fever and Dysentery.] —*Med. Klinik.* 1916. July 23. Vol. 12. No. 30. pp. 791-792.

Non-pathogenic bacilli of the colon group, which have been isolated from the faeces of patients suffering from typhoid fever or dysentery, are occasionally agglutinated by a specific typhoid or dysentery immune serum. This phenomenon has been called para-agglutination. Even cocci have been known to exhibit it. The susceptibility is lost after repeated subculturing. Such a race can be artificially created by growing *B. coli* on an agar medium containing a small quantity of a broth culture of one of the pathogenic organisms such as typhoid or dysentery. Not only the specific typhoid or dysentery serum but also other agglutinating sera will agglutinate the bacilli to some extent. In addition normal rabbit serum has a definite but much less marked agglutinating action.

It is evident, in view of these facts, that certain errors may arise. It would not be of much practical moment in an acute case if a non-pathogenic bacillus was mistaken for the true cause of the disease, but it would be a grave error to stigmatise a person as a carrier who happened to be passing harmless para-agglutinable bacilli. Another pitfall is that para-agglutinable bacilli may be looked upon as the cause of any given bowel affection whereas the true offender is one of the well-known pathogenic bacteria which has escaped detection. Mistakes of this kind have doubtless occurred in the past and may account for the large and ever-increasing number of different bacilli of the dysentery group, which are supposed to cause the disease. [Since para-agglutinable bacteria retain their power to ferment certain sugars intact, the moral is to supplement the agglutination test with fermentation reactions. If this practice is sedulously carried out no mistakes can arise.]

E. E. A.

*[The upper normal limit of agglutination for Shiga here given is considerably higher than most authors have found to obtain in Europe. It may well be that in the Tropics many individuals have passed through a subacute attack of dysentery, which is not forthcoming in their history, but was of sufficient intensity to stimulate the production of a certain amount of agglutinins.—E. E. A.]

JACOBITZ. **Ueber Ruhrbacillenagglutination.** [Agglutination of Dysentery Bacilli.]—*Berlin. Klin. Woch.* 1916. June 26. Vol. 53. No. 26. pp. 718-719.

One or two investigators have recently alleged that a prophylactic typhoid and cholera inoculation causes the appearance in the blood of agglutinins against Shiga bacilli. The importance of this is so great that the author has been led to probe the matter further. Forty-nine inoculated persons were tested. The conclusions reached were:—

1. In the blood of people inoculated with typhoid and cholera vaccines, agglutinins against Shiga bacilli do occur in a small number of cases, but they are also found in uninoculated persons.

2. As far as the observations go they do not favour the view that the inoculation with typhoid and cholera bacilli causes the production of agglutinins against *B. dysenteriae* Shiga, but on the other hand an attack of typhoid fever does appear to exert an influence in this direction.

3. The author has not seen an agglutination of Shiga in a higher dilution than 1 : 50 by the serum of persons who have never had dysentery, 20 hours being allowed for the test. This must be taken then as the upper normal limit.

4. Only coarse clumping must be taken as specific.

5. Given a suitable culture, the macroscopic test, coarse clumping, and a dilution above 1 : 50, then a positive agglutination test points to an infection with Shiga's bacillus even in a man inoculated with typhoid and cholera vaccines.

6. These considerations apply in the case of *B. dysenteriae* Flexner-Y with the proviso that the dilution of the serum must be greater than 1 : 100.

E. E. A.

UMNUS (O.). **Das Serumagglutination in der Ruhr und Pararuhrdiagnostik.** [Serum Agglutination in the Diagnosis of Dysentery and Paradysentery.]—*Med. Klinik.* 1916. July 2. Vol. 12. No. 27. pp. 723-725.

This paper sets forth the author's views on dysentery agglutination without any experimental evidence to support them. They are summed up in the accompanying table:—

Diagnosis.	Widal.	
	Shiga Dysentery.	Flexner Y-Dysentery.
1. Impossible	up to 1 : 100	up to 1 : 200
2. Probable	above 1 : 100	above 1 : 200
3. Certain	(a) above 1 : 400 (b) rising or falling titre.	— rising or falling titre.

[It is usually thought that a distinct agglutination in a serum dilution of 1 : 50 is sufficient for the diagnosis of a Shiga infection.]

E. E. A.

HALL (I. Walker) & ADAM (D. C.). **Differential Leucocyte Counts in Enteric and Dysenteric Convalescents.**—*Lancet*. 1916. Sept. 16. pp. 514-516.

The object of the investigation was to find out whether agglutinins in response to prophylactic inoculation could be distinguished from those appearing in the course of the disease itself by means of a differential leucocyte count. In the first place it was found that a typhoid inoculation made no appreciable difference to the relative proportions of the leucocytes. In the case of typhoid fever there is a persistence of low polynuclear and high mononuclear counts long after the pyrexia is over. This was the case also with paratyphoid A cases from France, but not with those from the Mediterranean area. In the case of paratyphoid B there was not any marked change in the cell counts, but the number of cases examined was not sufficiently large to justify definite conclusions being drawn from the paratyphoids. A few cases of mixed infection with *E. histolytica* and *B. paratyphosus* B showed a decrease in the eosinophils.

TABLE VI.

Disease.	No. of Poly-nuclears.		Eosino-lympho-cytes.		Transitionals and L. mono-nuclears.
	Average of	Per cent.	Per cent.	Per cent.	Per cent.
Paratyphoid A	5	53.5	3.9	35.4	7.2
" B	1	70.5	2.0	23.0	4.5
Paratyphoid B + <i>E. histolytica</i>	3	68.26	0.93	25.07	5.74
Paratyphoid A + <i>E. coli</i>	5	66.12	2.8	26.5	4.58
Paratyphoid B + <i>E. coli</i>	5	70.8	1.8	23.8	3.6
Paratyphoid + <i>Lamblia intestinalis</i>	5	67.7	2.8	25.0	4.5
Paratyphoid A	17	65.55	2.97	27.79	3.69
" B	33	69.76	2.78	23.21	4.25
Typhoid	6	49.3	2.16	40.64	7.9
Typhoid + <i>E. histolytica</i>	1	65.7	4.8	27.0	2.5

M.A. = Mediterranean area.

F.A. = French area.

E. E. A.

HEHEWERTH (F. H.). **Ueber Dysenteriebacillen und ihre Einteilung in Gruppen.** [Grouping of the Various Dysentery Bacilli.]—*Cent. f. Bakt.* 1. Abt. Orig. 1916. May 9. Vol. 78. No. 1. pp. 3-15.

The article begins with a good historical survey of the discovery of the different dysentery bacilli. A good deal of confusion has hitherto been introduced into this subject by workers relying on sugar reactions alone for differentiating the different species; or again by neglecting these and basing a classification solely on agglutination reactions. It was the author's aim to attempt to correlate these two factors.

A small epidemic of dysentery occurred in an internment camp in Holland. Twenty-six non-motile Gram-negative bacilli obtained from the stools of patients were examined. Their sugar fermentation reactions are given in the following table:—

TABLE I.

Strain.	Mannite.			Maltose.			Saccharose.		
	Very short time after isolation.	2-2½ months after isolation.	3½-4 months after isolation.	Very short time after isolation.	2-2½ months after isolation.	3½-4 months after isolation.	Very short time after isolation.	2-2½ months after isolation.	3½-4 months after isolation.
74a	+	+	+	+	—	—	+	—	—
74b	+	+	+	+	—	—	+	—	—
74c	+	+	+	+	—	—	+	—	—
77a	+	+	+	+	—	—	+	—	—
77b	+	+	+	+	—	—	—	—	—
77c	+	+	+	+	—	—	—	—	—
78a	+	+	+	—	—	—	—	—	—
78b	+	+	+	—	+	+	—	—	—
78c	+	+	+	—	—	—	+	—	—
78d	+	+	+	+	—	+	—	—	—
78e	+	+	+	+	—	+	—	—	—
21a	+	+	+	+	—	—	—	—	—
21b	+	+	+	+	—	—	—	—	—
22a	+	+	+	+	—	—	—	—	—
22b	+	+	+	+	—	—	—	—	—
23a	+	+	+	+	—	—	—	—	—
23b	+	+	+	+	—	—	—	—	—
23c	+	+	+	—	—	—	—	—	—
23d	+	+	+	—	—	—	—	—	—
24a	+	+	+	—	—	—	—	—	—
24b	+	+	+	+	—	—	—	—	—
25a	+	+	+	—	+	+	—	—	—
25b	+	+	+	—	—	—	—	—	—
59	+	+	+	—	—	—	—	—	—
88a	+	+	+	—	+	+	—	—	—
88b	+	+	+	—	+	+	—	—	—

It will be seen that they all ferment mannite and they are therefore not *B. dysenteriae* Shiga; but the instability of these reactions as regards maltose and saccharose is manifest from an examination of the five strains numbered 78, all of which were isolated from the same patient. Yet it is just upon the reactions of these sugars that the classification into Flexner, Y, and Strong groups is based.

The agglutination reactions were now investigated using sera prepared with two of their number and employing the Castellani absorption method. It was found that these did not run at all parallel with the results obtained with sugars. The author's final judgment is that at present we are unable to further classify the non-toxic dysentery bacilli since from the same epidemic strains can be isolated which are

serologically not related. The practical outcome of this is that an antidyentery serum should be prepared with as many strains as possible which, as regards agglutination, are as widely separated as possible.

E. E. A.

REMLINGER (P.). *Sur un nouveau bacille dysentérique atypique.*—*C. R. Soc. Biol.* 1916. June 17. Vol. 79. No. 12. pp. 576-578.

A variant of *B. dysenteriae* Shiga was isolated from a case in Argonne. It has the same fermentation reactions, but it is slightly motile. It was not agglutinated by any of the usual agglutinating sera, nor even by the patient's. Innoculation into rabbits produced a high titre agglutinating serum (1 in 3,000), which also agglutinated Shiga at a 1 in 100 dilution. [The evidence that it is pathogenic in man is very slender.]

E. E. A.

BONNEL (F.), JOLTRAIN (E.) & TAUFELIEB (R.). *A propos d'une petite épidémie de dysenterie bacillaire observée dans la zone des armées pendant l'été 1915.*—*Bull. et Mém. Soc. Méd. des Hôpit. de Paris.* 1916. Apr. 20. 3 ser. Vol. 32. No. 13-14. pp. 589-599. With 3 figs.

An account of a small epidemic of dysentery comprising 278 cases, with no deaths. It seems to have been caused by a bacillus belonging to the mannite fermenting group of organisms (Flexner-Y), although distinct from the well known types.

E. E. A.

SUTHERLAND (P. L.). *Bacillary Dysentery (Shiga) contracted in England.*—*Brit. Med. Jl.* 1916. July 29. p. 142.

A woman of 50 contracted dysentery six days after her son's return home. The latter had had the disease at the Dardanelles and it was still present in a subacute form. *B. dysenteriae* Shiga was isolated from the faeces of both these patients.

E. E. A.

CAHN (A.). *Ueber die Folgen geringfügiger Infekte von Ruhr und Typhus und über Ruhrnachkrankheiten.*—*Berlin. Klin. Woch.* 1916. June 12. Vol. 53. No. 24. pp. 642-646.

This is a reproduction of a lecture delivered on the above subject. The author's contention is that many ill-defined complaints such as "rheumatic" pains, lassitude, neuritis, myalgia, etc., can be attributed to a previous infection with dysentery or typhoidal disease. The cases investigated included patients who had passed through an attack of dysentery or typhoidal disease; those complaining of joint pains, etc.; others who gave no history of any of these diseases and were either apparently healthy or suffering from something quite different. The demonstration of agglutinins in the blood was naturally the only way of attacking the problem. Each serum was tested against *B. dysenteriae* Y and Shiga, *B. typhosus*, *B. paratyphosus* A and B. Of 157 cases tested 14 gave no agglutinations; 11, who were either

well or suffering from other diseases had a titre greater than 1:100 for Y or Shiga; 14, who complained of weakness, rheumatic pains, myalgia, etc., agglutinated dysentery bacilli alone.

Amongst other manifestations to be looked upon as caused by dysentery bacilli was neuritis, chiefly of the sciatic and trigeminal nerves. Two cases of paralysis of accommodation were observed which could only be attributed to dysentery. Some cases of arthritis had the additional complication of bladder trouble. Stomatitis was fairly common and dyspepsia was also observed.

This is not the first time that dysentery has been looked upon as responsible for these minor ailments. It is well known that a toxin is formed by the bacilli of Shiga type which in laboratory animals is very neurotropic causing extensive paralysis. We should expect this toxin also to be elaborated in man and occasionally cause lesions of a like nature.

E. E. A.

ROSE (Carl Wienand). **Ruhrnackkrankheiten und deren Behandlung mit Antidysenteriserum.** [Post-dysenteric Ailments and their Treatment with Anti-dysentery Serum.]—*Berlin. Klin. Woch.* 1916. June 12. Vol. 53. No. 24. pp. 646-648.

Certain authors have lately attempted to discredit the value of dysentery agglutination in soldiers on the plea that a prophylactic typhoid inoculation induces group agglutination of dysentery bacilli. Doubting the truth of this the author has tested the blood of 80 soldiers, who were in hospital for some different complaint, against Y and Shiga bacilli. They were specially chosen to avoid all intestinal infections and they had received typhoid inoculation within 1-3 months. None of them agglutinated the organisms in question.

The middle portion of the paper is taken up with an enumeration of the various postdysenteric ailments met with, after which there is an account of the benefits accruing from the use of anti-dysentery serum. Among the affections which quickly disappeared under this treatment were "rheumatic" joints, myalgia, neuralgia, neuritis, paralysis of accommodation, conjunctivitis, stomatitis, localanasarca, anaemia, dyspepsia due to decrease of acidity, and weakened heart. Two or three injections of polyvalent antidysentery serum at intervals of a day or two were usually sufficient. Serum rashes can be avoided by giving calcium chloride before the injection or by following FRIEDBERGER's advice of injecting small quantities of the antiserum at first, the remainder being given after a lapse of some hours.

E. E. A.

USENER (W.). **Zur Klinik der Bacillenruhr und ihrer Behandlung mit Atropin.** [The Clinical Aspect of Bacillary Dysentery and its Treatment with Atropin.]—*Berlin. Klin. Woch.* 1916. July 17. Vol. 53. No. 29. pp. 799-801.

The painful colic and tenesmus, which is such a marked feature of bacillary dysentery, together with the frequent completely liquid stools, are not adequately accounted for by the pathological findings. Their real cause is probably a toxic irritation of the sacral portion of the vagus.

A number of autopsies were made on dysentery cases in more than half of which the ileum was affected. A point of still greater interest was the finding of formed faeces, typical of those present in the large bowel, in the lower and even in the middle segments of the ileum. Sometimes the faeces were in a condition of fermentation, yellowish in colour, frothy, with little mucus; at other times they had undergone decomposition, were dark-brown, soapy, in the form of small pellets or resembling a pencil. The explanation of this is that irritation of the vagus can bring about the same spastic conditions in the small intestine as obtain in the large, giving rise to the retention of the effete products of digestion and allowing of the same kind of bacterial action. The stomach disturbance which is present in a certain number of the cases of dysentery would also be accounted for by a toxic affection of the vagus. These considerations suggested the use of atropine. The results were encouraging, as within 12-18 hours formed faeces appeared in the stools and within 18-24 hours the blood and slime were either gone or markedly diminished in quantity. The drug was injected subcutaneously in a dose of 0.5 mgm. two or three times daily at intervals of two hours. In order to avoid the effects of a possible idiosyncrasy 0.01 mgm. morphine was given in conjunction with the second dose. An increase of this dose is probably not necessary.

E. E. A.

FLEXNER (Simon). The Rapid Production of Antidysenteric and Antimeningococcic Sera.—*Jl. State Med.* 1916. June. Vol. 24. No. 6. pp. 161-171; July. No. 7. pp. 193-206. With 5 charts.

Owing to the sudden demand for anti-sera since the beginning of the war the Rockefeller Institute, of which the author is the director, resumed the manufacture of antidysentery and antimeningococcic sera. The old established method of preparing antidysenteric serum was by a series of subcutaneous injections into the horse. In from 9 to 12 months a high titre serum was obtained. The exigencies of the moment however have demanded a more rapid method. By means of repeated intravenous injections for short periods with intervals of rest it has been found possible to produce a serum of high protective value in about 10 weeks. Several varieties of dysentery bacilli are injected successively, both Shiga and Flexner types. Details of the process are given, which are of interest only to those engaged in the production of such sera.

The second portion of the paper deals with antimeningococcic serum.

E. E. A.

LOEWY (Otto). Dysenterieschutzimpfung. [Inoculation against Dysentery.]—*Wien. Klin. Woch.* 1916. May 18. Vol. 29. No. 20. pp. 617-619.

Certain authors have found that the addition of acid to the toxin of *B. dysenteriae* Shiga renders it innocuous but does not destroy it, since the subsequent addition of alkali restores its activity. Loewy has experimented on similar lines using suspensions of agar cultures of Shiga bacilli. Neutral and acid suspensions produced considerably less local reaction than alkaline ones, while a greater proportion of the

animals survived. Furthermore the amount of agglutinins and complement-binding antibodies formed in the animal's serum was independent of the reaction of the vaccine. The animals used were rabbits, guinea-pigs and goats. They did not receive a sufficient number of injections to induce much immunity. Some of the rabbits which were tested were unable to withstand a double lethal dose of toxin.

E. E. A.

MALARIA E MALATTIE DEI PAESI CALDI. 1916. May-June. Vol. 7. No. 3. pp. 204-218. With a map.—**Dissenteria bacillare epidemica. Pubblicazioni monografiche delle malattie degli eserciti in guerra della Scuola delle malattie esotiche annessa alla R. Clinica Medica di Roma.** [GABBI (U.) & GIUGNI (Fr.).]

This is another of the series of monographs, of a succinct and practical type, which are now appearing in the pages of the above periodical, for the benefit of military surgeons during the present war. The subject of bacillary dysentery is handled in this one in a very masterly manner.

J. B. N.

FLAGELLATE DYSENTERY.

FANTHAM (H. B.) & PORTER (Annie). **The Pathogenicity of *Giardia (Lambliia) intestinalis* to Men and to Experimental Animals.**—*Brit. Med. Jl.* 1916. July 29. pp. 139-141.

The authors have detected 187 cases of pure lambliasis among 1,305 soldiers invalided from Gallipoli, as well as among soldiers from the Western Front. They found that "in both human and animal lambliasis . . . erosion and distortion of the intestinal epithelial cells occurred, owing to the direct suctorial action of the flagellate *Lambliia*."

Human cases.—Some of the evidence in this section has been already published and summarised in this *Bulletin* [Vol. 8, p. 131]. Two strains were under observation, one from Flanders, the other from Gallipoli; the former was the more virulent. They note that lambliasis is well known in Italy and also occurs in Russia and Germany; it is not confined to the tropics, nor is its virulence reduced in cold countries, as has been supposed.

Animal experiments.—Kittens and mice were used. Strict precautions were taken to ensure the animals being free from *Lambliia* infection, since it occurs naturally in mice. They were fed on food contaminated with faeces or material containing lamblial cysts. Details of 17 experiments are given. Infection was obtained in all but four instances, the chief symptoms being diarrhoea and emaciation. The infected kittens died in from 6 to 53 days. Of the mice which became infected two recovered and the others died in from 7 to 76 days. Accounts of the post-mortems are given. Erosion of mucous membrane and engorgement of the blood vessels of stomach, intestines and mesentery were noted, and in two instances enlarged spleen and duodenal ulcers.

The conclusions are as follows :—

"1. *Giardia (Lambliia) intestinalis* is pathogenic to man and is capable of producing diarrhoea, which may be persistent or recurrent.

"2. The virulence of the parasite varies, and lambliasis occurs in tropical and non-tropical countries. The *Lamblia* cysts can remain infective for some time.

"3. Lambliasis occurs in rodents, especially rats and mice, and can be of human origin. The influence of rats and mice in the spread of lambliasis has been noted recently by Noc and by Mathis. Lambliasis may also be produced in cats. Lambliasis may be conveyed to man from these mammals.

"4. As a result, rodents may be reservoirs of lambliasis, and on the western front this should be remembered, as we have already published."

A. G. B.

SMITH (A. Malins) & MATTHEWS (J. R.). *Lamblia Infections in Men who have never been out of England.*—*Brit. Med. J.* 1916. Sept. 16. p. 389.

The present note records the cases of two soldiers who, though they had never been out of England, had an infection of *Lamblia* [more correctly, *Giardia*] *intestinalis*. The stools of the men were examined in the course of routine at the Liverpool School of Tropical Medicine. The first case was a man suffering from gastric ulcer. *Lamblia* cysts were found in his stool on the one occasion that a specimen was examined. The second case was that of a man who, after six weeks' training, was sent to hospital for treatment of diarrhoea. He had suffered from diarrhoea at irregular intervals for twelve years. The patient is still under observation. A third case of a sailor who, apart from two days spent in Holland, had not left England, yet had *Lamblia* in his stool on the two occasions that it was examined, is also mentioned. He was suffering from cardiac and gastric trouble when sent to hospital.

The first two patients contracted the parasites in England. The sailor possibly became infected here. The authors can offer no evidence as to time or place of infection, nor as to the possible or probable connection of the *Lamblia* with the diarrhoea produced. They state that it is almost impossible now and shortly will become impossible to offer evidence whether *Lamblia* is indigenous in England or not, owing to the presence of returned soldiers who are carriers of *Lamblia*.

[While in these two cases the parasites were acquired in England, there is no evidence that the parasites were of English origin, or that they might not have been acquired from some individual infected abroad with whom the men concerned had associated. It gives no evidence whether *Lamblia* is indigenous in England or not.]

A. P.

MIXED AND UNCLASSED DYSENTERY.

KRAUSE (Paul). *Vorkommen von Balantidium coli und Trichomonas intestinalis bei einem Darmkranken mit choleraähnlichen Erscheinungen.*—*München. Med. Woch.* 1916. July 18. Vol. 63. No. 29. pp. 1058-1060.

The paper contains an account of a patient, whose faeces contained *Balantidia* and *Trichomonads*, who suffered from acute diarrhoea so that he was suspected of having cholera, but who was free from

dysenteric bacteria and negative also for typhoid and cholera. The apparent association of *Balantidia* with disease-producing capacities is set forth at length.

The patient was a Landsturm recruit, aged 27, who, at the end of July, 1915, was for six weeks in Galicia and reached Ossowiecz. In August he suffered from diarrhoea, the stools containing some blood at the end of the illness. Several others in the same company were similarly afflicted. In the autumn, the man was sent to the Western Front, where he again suffered from diarrhoea, stools mixed with blood and mucus being passed seven times a day. Early in November, he became worse and cholera was suspected. The stools were somewhat like rice-water stools, flocculent, and contained leucocytes, mucous fatty drops, few bacteria, but numerous protozoa, which were identified as *Balantidium coli*. In later stools, *Trichomonas intestinalis* was found in smaller numbers.

Details of the case are given somewhat fully. The treatment was by salt infusions. The patient made a good recovery, and eventually rejoined the forces in the field. The Protozoa had disappeared when he became convalescent. Bacteriological examinations were negative for pathogenic bacteria.

The author gives a short account of all the previous findings of *Balantidium* species in stools that were of abnormal character, such as cholera and typhoid stools. Three species of *Balantidium* are known to be present in the human intestine at times, and the differences are put in the form of a table. A similar discussion on the association of *Trichomonas* with dysenteriform symptoms is also given, but no conclusion appears to have been reached.

A. P.

TRIBONDEAU (L.) & FICHET (M.). Note sur les dysenteries des Dardanelles.—*Ann. Inst. Pasteur.* 1916. July. Vol. 30. No. 7. pp. 357-362.

This is an important article inasmuch as it adds Morgan's bacillus to the ever increasing number of organisms which can cause dysentery. Many cases of the disease give negative bacteriological findings, and it may well be that some of them are due to this organism. It was first isolated by MORGAN in England from an epidemic of infantile diarrhoea. Until recently it has not been associated with diarrhoea in adults.

The present investigation deals with 217 cases of dysentery at Toulon, invalidated from the Dardanelles. Many of them were on the high road to recovery, which probably accounts for the large number of cases (169) in which neither amoebae nor pathogenic bacilli were found. Of the 48 positive findings:—

- 10 were *E. histolytica*.
- 23 „ *B. dysenteriae* Shiga.
- 2 „ „ „ Y.
- 13 „ Morgan's bacillus.

The interest centres round the last group. There is every reason to believe that these bacilli were the cause of the dysentery. The patients passed blood and slime, while Morgan's bacillus was present in large numbers, to the exclusion of the usual dysenteric germs. In all these cases the course of the disease has been severe and prolonged, with frequent relapses, ending in death in two instances. The only anomaly was that the patient's sera did not agglutinate the bacillus, nor were Shiga and Flexner bacilli agglutinated. The types of Morgan's bacillus isolated were the following :—

Type.	Lactose.	Glucose.	Mannite.	Maltose.	Saccharose.	No. of cases.
I. (Morgan's No. 1 of English authors)						
II.	0	+	0	0	0	7
III. A. .. .	0	+	+	+	+	1
B.	0	+	0	+	+	2
	0	+	0	+	+	3

After prolonged cultivation on artificial media the last two types lost the power to ferment all the sugars but glucose. They are all motile, produce indol rapidly, and blacken an agar medium containing lead subacetate. Morgan's bacillus was never found in the patient's blood. It was shown to be pathogenic for laboratory animals. An agglutinating and curative serum was easily produced.

E. E. A.

GUNSON (E. B.). Cardiac Symptoms following Dysentery among Soldiers.—*Lancet*. 1916. July 22. pp. 146-147.

During October 1915, 65 cases of dysentery were admitted to the 19th General Hospital, Alexandria, from Gallipoli. No examinations of the faeces were made, but clinically about 75 per cent. of the cases were amoebic. A number of the patients exhibited circulatory disturbances. There were three fatal cases. The pulse became extremely feeble, the extremities cold and clammy, while cardiac dilatation supervened in the terminal stages associated with extreme cyanosis. Of the patients who recovered 17 per cent. presented cardiac symptoms. Dyspnoea, palpitation, precordial pain, vertigo and exhaustion were the chief symptoms. The exhaustion was very marked in the severe cases and was greater than the muscular atrophy and weakness seemed to warrant, but no evidence of organic disease of the nervous system was present. The incidence of cardiac symptoms in this epidemic was high because most of the men remained on duty in the trenches until completely exhausted. The only drug which was found to be beneficial for the extreme cardiac weakness was adrenalin. It was administered subcutaneously every four hours in doses of 5 to 10 minims.

E. E. A.

HALL (I. Walker), ADAM (D. C.) & SAVAGE (R. E.). **Convalescent Paratyphoidal and Dysenteric Cases considered from the Preventive Standpoint.**—*Brit. Med. Jl.* 1916. Aug. 5. pp. 174–177.

The cases were drawn from the Mediterranean area, during the period September 1915 to February 1916. The distribution of the dysenteric amoebae is given in the table below :—

			<i>E. histolytica</i> present.
Dysentery cases			9·68 per cent. (605 cases).
Paratyphoidal cases			10·06 per cent. (581 cases).
Wounds, trench fever, etc. ..	1 case	.. ..	(5 cases).
Depot paratyphoids	5 cases,	21·7 per cent.	(23 cases).

As regards the disappearance of *E. histolytica* from the faeces in cases under treatment, it was found that the average time required before three consecutive negatives could be obtained was about 23 days.

E. E. A.

SICK (K.). **Ueber Veränderungen am Magendarmkanal im Gefolge von Typhus und Ruhr.** [Changes in the Digestive Tract following Typhoid Fever and Dysentery.]—*München. Med. Woch.* 1916. Aug. 15. Vol. 63. No. 33. pp. 1205–1207. With 1 text fig.

In the convalescent stage of both typhoid fever and dysentery some of the patients developed a marked distension of the abdomen. The cause of this appears to be a toxic action on the splanchnic division of the vagus nerve, which is supported by the fact that these cases usually exhibit an increased pulse-rate due to removal of the inhibiting action of the vagus. Decreased acidity of the gastric juice was commonly present in the dysentery cases. This late complication delayed complete recovery for 2–3 months.

E. E. A.

VON KORCZYNSKI (L. R.). **Bacilläre Ruhr und akuter hämorrhagischer Dickdarmkatarrh.** [Bacillary Dysentery and Acute Haemorrhagic Colitis.]—*Med. Klinik.* 1916. July 23. Vol. 12. No. 30. pp. 801–803.

This is the sequel to a previous paper and gives an account of the author's experience of bacillary dysentery at Sarajevo. In cases caused by Shiga's bacillus anti-dysentery serum was found to be of great value but should be employed in large doses—100 cc. or more.

A number of cases of acute haemorrhagic colitis, which were not dysentery, were classed together, no pathogenic bacteria having been isolated from them. They occurred for the most part during the months when typhoidal fevers and dysentery are most prevalent. Exposure to wet and cold, and indiscretions in diet are looked upon as the chief causes.

E. E. A.

ZIEMANN (H.). Zur medikamentösen Behandlung der Ruhr (durch Kombination von Bismutum subnitric. mit Karlsbader Salz).
[Drug Treatment of Dysentery, by a Combination of Bismuth Subnitrate and Carlsbad Salts.]—*München. Med. Woch.* 1916. Aug. 8. Vol. 63. No. 32. pp. 1170-1171.

After disposing of the various drugs in vogue for the treatment of bacillary dysentery, with the exception of anti-dysentery serum, as being more or less unsuccessful, Ziemann outlines his own special method of treatment. It is extremely effective not only in bacillary dysentery but also in the amoebic variety, and again in dysenteric diarrhoeas where a pathogenic bacterium cannot be found, and even in paratyphoid fever running a dysentery-like course. The essence of the treatment is the combination of Bismuth subnitrate with Carlsbad salts. The patient has a hot water bottle applied to his abdomen. A dessertspoonful of castor oil is administered immediately, and if this produces a copious motion, a teaspoonful of Carlsbad salts in 300 cc. (half a pint) of warm water is given four hours later. If this solution cannot be tolerated, the salt may be taken in cachets and the water drunk afterwards. Morning and evening of the next and subsequent days the patient takes a teaspoonful of Carlsbad salts in warm water, in conjunction with a 5 grain tablet of bismuth subnitrate 6 to 10 times a day. In the vast majority of cases the blood and slime disappear from the stools on the 2nd or, latest, on the 3rd day. If, contrary to what one expects, the blood and slime appear again in the motions the bismuth is withheld for a day or two. A tendency to constipation is combated by diminishing the bismuth and increasing the Carlsbad salts, while diarrhoea requires the converse modification. The ideal to be aimed at is to obtain three liquid stools a day. In the rare cases in which relapses occur the whole treatment is started afresh. The full treatment should be continued for at least 5-7 days after the stools have become normal and then gradually reduced. E. E. A.

REED (Alfred C.). The Use of Emetin.—*Boston Med. & Surg. Jl.* 1916. Sept. 14. Vol. 175. No. 11. pp. 375-380.

This paper goes over much the same ground as those of LEVY and ROWNTREE and of BALFOUR and PYMAN [see this *Bulletin*, Vol. 8, p. 218-9]. The author discusses the history, pharmacology, toxicology and uses of the drug. He notes that "practically all of the emetin used and even now available is impure and has been shown to have a dangerous variation in activity and toxicity. . . . Pure emetin . . . so far has not been thoroughly studied in either the clinic or the laboratory." HESSE, who has devised a method of isolation, attributes the chief danger in emetin to contamination with the strongly toxic cephaelin. The author refers to the profoundly irritative, local action, the depressant action on the heart and circulation after repeated small hypodermic doses in animals, death in emetin poisoning occurring from cardiac failure, and the irritating effect on the gastro-intestinal tract. The consensus of opinion, it is stated, is to the effect that emetin does act as an emetic, but it appears that this effect follows only administration by mouth. The symptoms above named occur in poisoning, in which there is "often a condition scarcely to be distinguished from acute beriberi."

In the treatment of amoebic dysentery "not infrequently the diarrhoea from emetin is confused with the amoebic diarrhoea and the drug is continued or increased to a dangerous degree." Cases of mild poisoning seen in China are mentioned. Reference is made to LEVY and ROWNTREE'S 20 tabulated cases, and especially the cases of peripheral neuritis. It is recognised that "a beriberi or pseudo-beriberic condition may arise in dysentery [both amoebic and bacillary] and be credited to emetin." On the question of dosage the author's views are in accord with those of BALFOUR and LOW. Finally the uses of the drug in amoebic dysentery, tropical abscess, pyorrhoea, as an expectorant and for haemorrhage are discussed. The value of the two last uses is doubted.

A. G. B.

BERIBERI.

ASHBURN (P. M.). **Beriberi in Panama.**—*Proc. Med. Assoc. Isthmian Canal Zone for the Half Year Oct. 1914 to Mar. 1915.* [1916.] Vol. 7. Pt. 2. pp. 101-129. With 6 charts.

A disease clinically indistinguishable from beriberi has been frequently reported to be more or less commonly present in the Panama area. From the medical returns the author has compiled a chart showing that from 1887 there are marked fluctuations in the incidence of the disease, and it appears that the Canal work was commenced during one of the epidemic periods and the disappearance of the cases from the Ancon hospital coincided with the subsidence of the epidemic. The author states that he is firmly convinced by the observations of BRADDON, FRASER, STANTON and others that beriberi in the Orient is a deficiency disease dependent on an insufficient supply of vitamins, and that their absence in the food is as important a fact for diagnosis, as is the presence of alcohol or lead in the respective forms of neuritis produced by them. In the Canal Zone district the food supply generally appeared to be good and included beans and other anti-neuritic substances; a number of dietary tables are given to demonstrate this. The disease is seen to have a marked periodicity with its maximum towards the end of the wet season, and it was often associated with malaria, rarely affecting children and old people. He made a special study of an epidemic at the National Institute or Government Academy, where the hygiene was generally excellent, the food abundant, fresh, and varied, and no evidence of a deficiency of anti-neuritic food was present. He states that up to the present no sufficient clinical or laboratory investigation of the beriberi-like disease has been carried out in the Canal Zone, and suggests that when this is done particular attention should be paid to the blood, post-mortem pathology, incidence of the disease in children, dietary, and the prevalence of insects and mosquitoes. It is noted that there were no cases recorded in the leper hospital, and that one cause of the rapid decrease in the number of cases treated at the Ancon hospital was the fact that after 1906 most of the charity subjects, who provided the greater number of the beriberi cases, were sent to the Santo Tomas hospital.

As a possible explanation of the occurrence of these forms of beriberi in apparently well-fed individuals the author brings forward the theory of BRADDON and COOPER, who hold that the quantity of the vitamin-containing substance must bear a definite proportion to the carbohydrates ingested; when this necessary balance is not maintained beriberi results. Thus a dietary with an apparent sufficiency of vitamin-containing food may by the addition of large quantities of carbohydrates become dangerous; therefore, as the exact proportion required is unknown, it is necessary to have the anti-neuritic foods as high as possible.

P. W. Bassett-Smith.

MCDONALD (W. M.). **The Beriberi Puzzle: A Suggested Solution.**—*Jl. Trop. Med. & Hyg.* 1916. Aug. 1. Vol. 19. No. 15. pp. 177-178.

The author, "as an observer not of the disease itself but of the circumstances of its occurrence in different parts of the world," is apparently a firm believer in the infectiousness of beriberi, and considers that the discovery of FRASER and STANTON instead of clearing up the puzzle only makes it more complicated. He, like many others, limits his horizon to the rice theory, which as we know is only part of a fundamental fact in certain areas, whereas the supply of rice or any other staple diet has to be considered together with many secondary factors before drawing conclusions about any outbreak. He cites five instances, which without further information discredit the view that the disease is due to "deficiency," and argues that the age and sex incidence are also against this. He also holds the view that experimental cases in men and animals in which errors in diet have been proved to produce the disease are not true beriberi but a form of peripheral neuritis like beriberi. In his opinion beriberi is entirely dependent on overcrowding and unhygienic sleeping accommodation, it is probably a protozoal disease conveyed by bed bugs or body lice [a theory which has many times been disproved] and the prophylactic measures necessary are, improvements in housing and sleeping accommodation where large numbers of men live together.

P. W. B-S.

FLEMING (Robert A.) & GIBSON (H. J. C.). **Three Cases of Beriberi.**—*Edinburgh Med. Jl.* 1916. July. New Ser. Vol. 17. No. 1. pp. 27-33.

The authors describe three cases of beriberi treated at the Royal Infirmary, Edinburgh; all three were firemen, two from the steamship "Araguez," and one from the steamship "Perana," and all had started from Rio. The symptoms were of moderate severity with marked signs of peripheral neuritis and some cardiac dilatation. They all improved under treatment in which a varied and good dietary played an important part, though one of them developed pulmonary tuberculosis. It is stated that the men were poorly clothed and suffered severely from the cold on arrival. One ship was visited and the conditions of the forecabin were exactly those so often described by Sir Patrick MANSON as a perfect incubator for the growth of any germs.

There was no history of previous epidemics of beriberi in either ship. Out of forty men in one ship there were five definite cases and two others with mild symptoms; the ship carried no medical officer. The food is stated to have been:—

6.30 a.m.—Coffee, bread and butter.

10.0 a.m.—Stewed meat, rice, beans, farina and coffee.

4.0 p.m.—The same kind of dietary.

7.0 p.m.—Tea and bread and butter. The rice that was used was not of the highly polished kind.

It would seem therefore that vitamines containing foods were abundant [but nothing is stated as to the cooking, which might easily destroy the protective qualities]. The beans were examined and were found to be *Phaseolus vulgaris*. During the voyage no complaints with regard to the food were made by the crew. The authors consider that the cold weather might have precipitated the attacks, and they do not think the facts point to a "deficiency" of any element in the diet but rather to a toxin of some unknown origin as being the cause of the outbreak.

P. W. B-S.

GESTEIRA (Martagão). **Um caso de beriberi infantil.** [A Case of Infantile Beriberi.]—*Brazil Medico*. 1916. July 1. Vol. 30. No. 27. pp. 209-212. With 1 fig.

A case of beriberi in a child aged 2½ years, admitted into hospital with a history of having, 12 days before, been taken with pains in the chest and legs, oedema of the lower limbs and difficulty in walking. In addition there was considerable blepharoptosis, especially of the left eye, with marked pupillar dilatation. Examination of the cardiac region showed that the pains in the chest were due to pericardial effusion. An illustration of the child is given showing the above general features. A diagnosis was made of beriberi. Except that the child recovered, nothing is said of the progress of the case, or of the treatment adopted, or of the probable cause of the condition.

J. B. Nias.

MATSUOKA (Yeisaku). **On the Pathological Anatomy of the Lungs in Beriberi (Kakke).**—*Jl. Path. & Bact.* 1915. Oct. Vol. 20. No. 2. pp. 191-213.

A considerable amount of work has been done to clear up the pathology of beriberi but the greater part has been devoted to the changes in the nervous system. The Japanese school hold the hypothesis that neuritis and contraction of the blood vessels are essential factors. YAMAGIVA has described the pathological findings in the lungs, but certain points bearing on the causes of the dilatation and hypertrophy of the right heart and the changes in the volume capacity of the lungs have not yet been satisfactorily explained. In the present work the author has attempted to clear up certain of these points. Five cases are very fully described and the findings discussed, the anatomical histological conditions found being compared with numerous control cases. He points out that the upper portion of the anterior border of the right lower lobe is a particularly favourable selective area and that collapse in this position alone is of considerable importance, as excepting for emphysema this part is very rarely the seat of any other disease condition. He found that the oedema of beriberi lungs is always associated with congestion; this is not entirely due to the agony period but may occur before through the feeble action of the left ventricle and is followed by the hypertrophy of the right. This oedema is always diffused while that produced during the agony period is localised and hypostatic. The volume of beriberi lungs is generally

equally diminished throughout; they show areas of collapse but though the amount of air is diminished the blood supply is increased in them. Emphysema is rarely found except in localised patches, together with areas of collapse, the margins of the lungs remaining sharp. He states that the diminished capacity of the lungs is not due to the slight increased height of the diaphragm due to paresis in beriberi, as this would only affect the lower lobes; hydrothorax however plays a very important part, occurring in 80 per cent. of his cases, but probably many other factors come into play to cause the diffuse uniform diminution in volume. In his investigations he found splenisation usually in the posterior and lower portions; in 66 per cent. in the left lung and 50 per cent. in the right.

Whether as suggested by YAMAGIVA there is an ante-mortem contraction of the small arteries of the lungs causing a dilatation hypertrophy of the right heart is doubtful; this view is opposed by OGATA. It appears that the dilatation hypertrophy of the typical beriberi heart is due to the collapse of the lung associated with the congestion oedema arising from the early enfeeblement of the left ventricle and, as the resistance in the pulmonary circulation becomes more marked, the hypertrophy of the right heart increases to overcome this and is followed by dilatation.

P. W. B-S.

SARASI LAL SARKAR. **Outbreaks of Epidemic Dropsy in Mofussil.**—*Indian Med. Gaz.* 1915. Oct. Vol. 50. No. 10. pp. 368-394; Nov. No. 11. pp. 417-419.

This is an account of various small outbreaks of epidemic dropsy occurring in India, at Nator in 1906, Dhanbaid, Behar in 1909, and at Muragacha in 1914. At Nator all the cases were in the household of a rich merchant; 19 persons were affected and there were four deaths, three women and one man. The onset is stated to have been sudden. Most of the family after the evening meal were attacked with vomiting and diarrhoea which lasted three or four days; the later symptoms were a low type of fever, a more or less general oedema with diarrhoea, sometimes dyspnoea, tachycardia, and dysentery. When the oedema passed off the limbs were wasted and painful. Albuminuria was recorded in one case. In the fatal cases there was marked cardiac dilatation and death was due to heart failure. In this outbreak the very limited distribution, sudden onset, absence of outside evidence of infection, pointed to food being the cause of the disease. In the other two epidemics the infection is also stated to have been traced to the use of food from particular shops but no definite proof is given. The author makes some remarks on the appearance and disappearance of the epidemics and gives details of cases which are of little interest, and he throws no new light on the etiology. [This is a distinct disease from beriberi with which the author appears to confuse it.]

P. W. B-S.

MCCOLLUM (E. V.) & KENNEDY (Cornelia). **The Dietary Factors Operating in the Production of Polyneuritis.**—*Jl. Biol. Chem.* 1916. Apr. Vol. 24. No. 4. pp. 491-502.

In reviewing previous work on the essential substances that are required for growth, described by FUNK and others as "Vitamines" and HOPKINS as "Accessory," the authors point out that neither terms are correct, Vitamine claiming too much, Accessory too little. The authors have formulated an hypothesis that in addition to the ordinary constituents of diet—proteins, carbo-hydrates, fats, and inorganic salts—the growing animal requires two substances, or groups of substances: one which is soluble in fat, A, and a second soluble in water and alcohol, B. In this paper they report further work on these two classes of substances. The experiments were carried out on pigeons; polished rice and butter fat, polished rice and alcoholic extracts of fat-free wheat embryo, potato juice, cabbage juice, oat extracts, and acetone, benzene, and ethyl extracts of fat-free wheat embryo were used. From their investigations they conclude that it seems certain that both the fat-soluble substance A and the water-soluble substance B are essential for life as well as growth, and that in the production of polyneuritis in birds by the exclusive feeding on rice or purified food stuffs the degeneration of the nerve cells is the specific result of a deficiency of the water soluble B. "The fat-soluble A appears to be dispensable, when maintenance alone is involved, for a somewhat longer period than is the factor B." The details of the experiments are given and those interested in the subject should read the paper in the original.

P. W. B-S.

EIJKMAN (C.). **Invloed van de voeding en van voedselonthouding op het ontstaan van polyneuritis gallinarum, Naar gemeenschappelijk met Dr. C. J. C. van Hoogenhuyze ingestelde onderzoeken medegedeeld.** [The Influence of Feeding and Deprivation of Food in the Production of Polyneuritis Gallinarum. A Research undertaken with the Co-operation of Dr. C. J. C. van HOOGENHUYZE.] —*Geneesk. Tijdschr. v. Nederl.-Indië.* 1916. Vol. 56. No. 3. pp. 257-294.

A research undertaken by the author on the subject of fowl polyneuritis. The birds under investigation were kept without food but were given large quantities of water, either by the mouth or subcutaneously, normal salt solution and Ringer's fluid being also employed. The result was the induction of typical polyneuritis after an interval, varying between 14 and 28 days according to the condition of the bird, by which time the original weight of the bird had been reduced by about 40 per cent. Control experiments were carried out in which the birds were supplied with water, but were kept without food, with the exception that 5 grammes per day of compressed yeast were given. Under these conditions polyneuritis did not supervene, though the test was continued till the birds had lost more than 50 per cent. of their weight. The experiment was varied by giving various kinds of food, such as polished rice, but the details need hardly be given.

The author's conclusions are summarised as follows :—

1. The observations of CHAMBERLAIN, BLOOMBERGH and KILBOURNE, to the effect that entire deprivation of food, by itself, can produce fowl polyneuritis* is confirmed, and the supervention of such symptoms is aided by copious washing out with water. The polyneuritis is therefore to be regarded as being solely the result of a deficiency in protective, or anti-neuritic substances, the so-called vitamins. If these are supplied in the form of yeast, then the disease does not occur in spite of an extreme degree of emaciation. Yeast will, of course, prevent the polyneuritis induced by a defective diet in the same way. Birds submitted to these experiments exhibit a resistance to the supervention of symptoms in proportion to the goodness of their original condition.

2. On these grounds the idea of a tissue poison in the food, or one arising from mal-digestion in the alimentary canal, can be excluded, as the cause of polyneuritis. On the other hand, the idea of a tissue-poison produced by the alteration of tissue changes incidental to starvation or mal-nutrition is favoured.

3. Even when polyneuritis is induced, no direct relation can be traced between the degree of inanition and the tissue degeneration induced, in the sense that the latter is the result of the former. Most commonly the polyneuritis supervenes before the loss of weight is very marked.

4. Feeding does not play the chief rôle in the production of the disease, but affects its course.

5. A supply of food probably brings about an improved utilization of the protective substances in the organism ; but the view of BRADDON, COOPER and FUNK that carbohydrates are more important in this connection than proteids does not seem well founded.

6. The digestion of raw polished rice by fowls is assisted by the addition of cellulose, in the form of washed rice-bran, sawdust and paper-fibre, but not by the addition of anti-neuritic rice-bran extract. The addition of cellulose thus improves the state of nutrition, but the supervention of polyneuritis is thereby more hastened than delayed. Finally, all conclusions as to the influence of different factors on the production of polyneuritis in birds are much affected by variations in the condition of individual birds, so far as concerns the date of the supervention of symptoms.

J. B. N.

BREINL (A.). **Note on Experiments on Polyneuritis in Pigeons.**—*Jl. Trop. Med. & Hyg.* 1916. June 1. Vol. 19. No. 11. pp. 129–130.

This is a contribution bearing on the infectiousness or otherwise of beriberi. MC GARRISON (1914) has described some experiments on pigeons, from which he obtained cultures of an organism which when inoculated into rabbits produced symptoms of polyneuritis [see this

* *Philippine Journal of Science.* 1911. Vol. 6. p. 177

Bulletin, Vol. 5, p. 116]. Before the appearance of this paper some experiments had been carried out at Townsville to see if the polyneuritis of pigeons was infectious and whether their cages became infected, and afterwards to see if any organism could be found in the blood and organs of the diseased birds similar to that described by MC GARRISON.

These were not confirmatory, no infective organisms were obtained from the blood of 12 paralytic pigeons, and there was nothing to show that the cages in which the infected birds were kept had any influence in producing the disease in normal pigeons fed on ordinary diet. A short record of the experiments is given in a tabular form.

P. W. B-S.

BOOK REVIEWS.

MAXWELL-LEFROY (H.) [M.A., F.Z.S.]. **Measures for Avoidance and Extermination of Flies, Mosquitoes, Lice and Other Vermin.**—17 pp. With 5 figs. 2nd Edit. Revised for the Tropics. 1916. London: W. Thacker & Co., Calcutta & Simla: Thacker, Spink & Co. [Price 1s. net.]

This pamphlet, a second edition with added matter "specially applicable to India," is accurately described by its title. The methods described have been proved useful, and the formulæ and direction for preparing the various insecticides are given in an appendix. Eleven pages are given to lice and flies and some fly traps are illustrated; the section on mosquitoes contains nothing that is not known to medical men in the tropics. The pamphlet is entirely practical and it is worth the while of all tropical practitioners to obtain it.

A. G. B.

MOULLIN (C. Mansell) [M.A., M.D. Oxon, F.R.C.S.]. **The Biology of Tumours.**—55 pp. Demy 8vo. 1916. London: H. K. Lewis & Co., Ltd. [Price 2s. 6d. net.]

This little book is a development of the Bradshaw Lecture given before the Royal College of Surgeons in 1912. The author expects to meet with adverse criticism. He considers the most satisfactory basis for classification of tumours to be their mode of origin, and divides them into those due to the reproductive power of the tissues being suddenly roused into activity and those due to changes that occur in the course of development being imperfectly carried out. The first are gemmation tumours; the primitive power of asexual reproduction is revived. They include the vast majority. He divides them into those springing from the germ cells and somatic cells respectively. He proceeds to discuss the conditions that lead to the production of tumour buds, the arrest of tissue development and the inheritance of gemmation tumours, the conclusion being that tumours cannot be transmitted by inheritance but the condition that is essential for their production can be. The account is one which cannot fail to interest.

A. G. B.

TROPICAL DISEASES BUREAU.

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TYPHUS.

MOON (R. O.). **The Chadwick Lectures on Typhus Fever in Serbia.** Delivered at the Royal Society of Medicine on Oct. 20th and 29th, and Nov. 3rd 1915.—*Lancet*. 1916. May 27. pp. 1069-1073; June 3. pp. 1111-1114; June 10. pp. 1157-1160.

These papers contain an interesting survey of typhus fever. The history of the various outbreaks from 1700 A.D. to the present time is detailed, and especial note is made of the association of typhus with war and famine periods. The influence of climate also is considered. In Serbia there would have been no typhus epidemic had there been no war. The epidemic "took its origin among the Austrian prisoners." The starting point appeared to be Valjevo, not far from the Bosnian frontier. The direction of spread was south-east and then south. The appalling sanitary conditions resulting from inadequate means of coping with the epidemic are fully described. Overcrowding, physical exhaustion and ill-nourishment all contributed to the loss of life. Under the International Sanitary Commission "to the British had fallen the care of the [Serbian] army and most of the hospital work except that done by the Serbians themselves."

An interesting account of the resemblance and former confusion between typhus and plague, from early times onwards, is given. The account of relapsing fever in Serbia is important and from all the author's personal experience it is noted that "there is more actual suffering in relapsing fever than in typhus, though the former is a much less serious disease." Convalescence from relapsing fever is apt to be slow compared with that from typhus, and it confers but little immunity. With regard to the specific agent of relapsing fever, the author considers that "this spirillum or its spores are given off with the breath or from the skin and are received into the air vesicles of the lungs with the inhaled air." [Apparently the work of NICOLLE, BLAIZOT and CONSEIL, as well as that of SERGENT on the transmission of relapsing fever by the crushing of infected lice on to the skin, is not known to the author.] The supposed connection between typhoid and typhus is discussed and the difference indicated.

The third lecture is devoted to the prophylaxis and treatment of typhus. Stress is laid on sanitation and personal cleanliness, on combating, overcrowding and lack of ventilation, and coping with problems incidental to destitution. With regard to treatment,

absolute rest in bed is essential. The sickroom should contain only what is indispensable for the care of the patient. Thorough ventilation is a necessity. Hydrotherapy is most useful. The diet should be mainly milk, but there is no objection to giving solid food if the patient's mental condition allows of his swallowing it. Attention must be given particularly to the nervous system and to the heart.

A. Porter.

HOWELL (B. Whitworth). **The Typhus Fever Epidemic in Serbia 1915.**

—*St. Bart. Hosp. Jl.* 1916. Feb. Vol 23. No. 5. pp. 52–54.

With 1 chart.

The author gives an account of his experiences of the typhus epidemic at Vrnjatchka Banja, Serbia, in 1915. He states that there is no doubt that lice transmit the disease, and that perhaps fleas and bugs also have a share. The Serbians believed in infection by inhalation. The majority of the patients were Austrians, the rest Serbian with a few civilians and English nurses. The mortality was much greater among the Austrians, who were prisoners of poor physique. The patients generally arrived in a state of collapse. It was found essential that the hair of the head and pubic region should be shaved and treated with paraffin oil or mercury ointment, but even then, fresh crops of lice appeared. The incubation period was about twelve days. The initial symptoms were like those of influenza. Deafness was frequent and persisted throughout the disease. It was sometimes very obstinate. "The drunken look about the eye was very characteristic, the conjunctivae being much injected. This was an early sign, beginning just after the onset and before the rash; hence the diagnosis could often be fairly safely made before the appearance of the rash." The rash on the average appeared on the fifth day. The macules were at first red, later they became slightly raised and purplish in colour. A number of them became regular petechiae, extravasation of blood occurring. The mental symptoms took two forms, one "a low muttering delirium, with much muscular weakness, the other, wild and maniacal."

The commoner complications were broncho-pneumonia, otitis media and deafness, parotitis, laryngitis, gangrene, hemiplegia, neuritis and melanuria.

It was found that "the older the patient, the higher the mortality." Violently delirious patients did badly. The treatment varied only in detail. In general it was stimulative. Plenty of fresh air and good plain food were given. The alleviation of oral and faucial sepsis was imperative, hydrogen peroxide being chiefly used for this purpose. The Serbians were not in favour of alcohol. The author's Unit used it a good deal in half-ounce doses, increasing it as the pulse got weaker. Aspirin and phenacetin and caffeine citrate were given for headache. Digitalis was given by the mouth and hypodermically, no digitalin being available. Strychnine also was given.

Personal prophylaxis involved the use of long linen gowns tightly buttoned over the collar and wrists, gum boots or Wellingtons, frequent change of linen and systematic search for lice. Some members anointed themselves with paraffin or vermijelly. Rooms were fumigated with sulphur. The dead were buried as quickly as possible, as they rapidly decomposed.

A. P.

CHESNEY (Lilian Mary). **Typhus Work in Serbia.**—*Practitioner*. 1916. May. Vol. 96. No. 5. (No. 575). pp. 542-550.

This paper contains an account of the author's recollections of ten months' work in Serbia, documents and note books having been lost with equipment. The hospitals with which the author was connected were stationed at Kragujevatz, a large barracks being used as a hospital.

The typhus fever epidemic described was initiated by Austrians, spread to the soldiers and then to the civil population. Many of the members of the Serbian Medical Service were victims. At the time when the writer reached Serbia, the medical organization there was more or less paralysed by the magnitude of the task, and cases of typhus were not separated from others. A separation was effected and in about a week the typhus patients alone were in the hospital, the other cases being distributed among other hospitals in the town. The wards were clean and not allowed to be overcrowded; one patient only was allowed in each bed. Bathing arrangements were made, were rough and ready, but not bad. Owing to difficulties in obtaining wood, the sole fuel, heating combined with ventilation was difficult. Lice were eliminated but fleas could not be abolished. The hospital itself was easily kept clean. The great difficulty was the sanitary arrangements, cesspools, sometimes within the building and sealed up when full, being in use. "The whole building was chronically pervaded by the smell of overflowing cesspools. The cesspool also overflowed outside into the laundry, which was not a desirable arrangement, but it did not seem to disturb the mind of our director at all." Coffins were mere open shells and were used repeatedly, the bodies being tilted out into pits on reaching the cemetery.

There were 200 beds in the hospital. Each ward had two English Sisters and a Serbian and two Austrian prisoners as orderlies. The prisoners liked the work, made good nurses and were preferred by the Serbs as nurses to their own countrymen. The typhus was usually of a severe type. Nearly all the cases had the rash developed before they were brought in for treatment. The stronger men suffered more severely than the weaker ones. "The very wretched Austrian prisoners, of course, often died, generally from heart failure, at or just before the crisis." The majority of deaths occurred at the crisis. There were very few complications, parotitis being the most common. In Serbian hospitals, where there were no nurses, post-typhus gangrene was extremely common. "It is of a moist, absolutely stinking variety, and, once begun, there is nothing for it but to amputate high up." Many forms of treatment were tried. In the opinion of the author, one treatment did as well as another. The chief point was good nursing. Ordinary Serbian diet was used as far as possible, owing to Serbian prejudices. While the louse was considered the chief transmitter, it is thought that other agents and means of infection must occur.

A. P.

TULLIDGE (E. Kilbourne). **Fleck Typhus. The Scourge of the Eastern War Theatre.**—*New York Med. Jl.* 1916. June 17. Vol. 103. No. 25. Whole No. 1959. pp. 1167-1169. With 2 text figs.

This paper contains an interesting general account of typhus as observed in the Eastern War Theatre. The symptoms, especially the

appearance of the rash, are given, and body lice are held to be the chief transmitters. A short history of the losses due to typhus in the wars in Mexico, the American Civil war, the Spanish war and the Balkan wars is given. In the last-mentioned, the losses were particularly severe among the Bulgars. On the Eastern Front, *Acarus scabiei* is a very great pest to the men, almost as great as lice, so that measures are taken against them in some places, as at Miskolcz, where the author worked.

The lice problem was dealt with vigorously. The men were thoroughly washed, their clothes were sterilised and they were shaved, "not one hair being allowed to remain on the body." They were then bathed again and sprayed all over with gasolene. A third bath after ten minutes finished the disinfection, and then the patients were sent to the hospital wards. In spite of these precautions, lice found their way into the wards, and the doctors and staff had to use protective clothing.

The treatment of typhus is considered unsatisfactory. Nervous symptoms need prolonged attention. "Spirit of nitrous ether to relieve congestion and reduce the extremely high fever was without an equal." For improving the heart action and the general condition, strychnine, spartine, strophanthin and thyroid extract were good. The author thinks that the latter remedy should be used with more confidence.

A. P.

MCNEIL (H. L.). **Endemic Typhus Fever in South Texas.**—*Texas State Jl. Med.* 1916. Aug. Vol. 12. No. 4. pp. 188-191.

Endemic typhus is believed by the author to be present in a mild form in Texas, at any rate in the southern part. Cases that have been classed as mild and atypical typhoid are now thought to be mild typhus. Five cases that occurred prior to the recent outbreak in Mexico, are now described. None occurred in Mexicans and one only had been in Mexico.

A resumé of BRILL's description of the disease that until recently bore his name is then given, and is followed by an account of the five cases that came under the author's observation. In each case the onset of the illness was by a chill. Widal's reaction was negative in the four cases in which it was possible to perform it, and the blood cultures of the same four cases were also negative. All the cases showed a rash. One case terminated fatally. PLOTZ's work had not been published at the time, so that cultures made anaerobically after his method were not available.

In conclusion attention is drawn to the fact that "the hemorrhagic type of typhoid fever, characterised by numerous petechiae over the abdomen and body as well as by the severity of the illness may be very readily confused with a severe hemorrhagic case of typhus unless both blood counts, Widal's and blood cultures are made." The author believes, however, that the mild form of typhus can, as a rule, be readily distinguished clinically from typhoid.

A. P.

HAIGHT (H. H.). **Endemic Typhus Fever in Toronto.**—*Canadian Pract. & Rev.* 1916. May. Vol. 41. No. 5. pp. 185–191.

This paper records an interesting case of infection with septic rash, which is now believed, in the light of recent research, to have been really a case of typhus. The patient, seen in 1913, was a teacher in a district of Toronto where the pupils consisted for the most part, of new arrivals from South-Eastern Europe. Malaise, general indisposition and soreness of the scalp characterised the case when it first came under observation. The teacher attributed her condition to contact with the dirty children whom she taught. A few sores of pinhead size were scattered over the crown and the scalp was tender. The post-trochlear glands were visibly enlarged and superficial cervical glands generally palpable. On the third day the patient showed profound shock, an ashen facies, sunken eyes, lips covered with sordes, with pain in the back and lower extremities. The case was believed to be one of small-pox and measures were taken accordingly with the other inmates of the house. On the fourth day, rose-coloured spots appeared on the trunk and limbs. On the fifth day, "splashes of blue, blue-black and blue-red covered the body, elderberry splashes I would call them; all sizes but all spots essentially splashes in contour and outline; beautifully rose-tinted spots were sparingly scattered over the uncolored skin between the elderberry splashes." On the sixth day, spots were found on the nape of the neck and head lice were also found. From then improvement occurred; by the ninth day, the temperature was normal and the progress of convalescence uneventful. The author's original diagnosis of "phthiriasis septic infection" is explained, and the author gives a discussion as to the possibility of the head louse transmitting typhus,* and as to the identity of Brill's disease with typhus and concludes with some general remarks on the character of typhus as a "verminous disease of uncleanness."

A. P.

ARCHIVES DE L'INSTITUT PASTEUR DE TUNIS. 1916. Sept. Vol. 9. No. 4. pp. 215–290. With 62 Charts. **Nouvelles études sur le typhus exanthématique pratiquées à l'Institut Pasteur de Tunis et dans les formations sanitaires de la Régence** (1916). NICOLLE (Charles), BLAIZOT (Ludovic), POTEL (Réné) & POIRSON (Henri).

The substance of this collection of papers has in part been published [see this *Bulletin*, Vol. 7, p. 62]. Other portions are summarised in this number.

NICOLLE (Charles). **Identité des virus exanthématiques africain et balkanique.**—*Bull. Soc. Path. Exot.* 1916. June. Vol. 9. No. 6. pp. 402–410. With 9 charts.

The author discusses the problem of the plurality of the virus of typhus. He first proved the rôle of the louse in typhus transmission, using the Tunisian virus. Patients from Algiers and Morocco came

* [GOLDBERGER and ANDERSON (1912) have transmitted Mexican typhus by means of the head-louse. See also in this connection this *Bulletin*, Vol. 6, p. 386.]

to Tunis, and by experiments the identity of these viruses with the Tunisian one was established. The complete verification of the identity of the African and Balkan typhus virus was obtained by observations of Serbian patients and by experiments with the virus from them. Clinically the Balkan form was like that in Berbery. Relatively benign to the population where it is endemic, its severity was very great to infected Frenchmen. A specific used reduced the mortality among the French who were treated to 3 in 25. The untreated cases died. There are no details as to the nature of the specific. The Serbian virus is identical in its effects on the monkey and the guinea-pig with the Berberan virus.

By experiments it has been shown that an effective inoculation of African typhus virus protected against a subsequent inoculation with Balkan typhus virus and vice versa. Details of the experiments are given, and also the temperature charts of the monkeys and guinea-pigs used.

A. P.

NICOLLE (C.) & BLAIZOT (L.). **Sur les resultats de la sérothérapie dans le traitement du typhus exanthématique.**—*Bull. Acad. Méd.* 1916. Aug. 1. Vol. 76. Year 80. No. 31. pp. 99–101.

In a previous paper [see this *Bulletin*, Vol. 8, p. 62] the authors have shown the effect of serotherapeutical treatment on animals. The serum was inoculated intravenously, and was obtained from an ass and a horse that had been inoculated intravenously with emulsions of the organs of guinea-pigs infected with typhus, those organs that had been shown to be the least toxic and the most virulent being employed. These were usually the suprarenal bodies and the spleen. The present paper is concerned with the results of the administration of similar serum to 38 human patients, of whom 22 were French, 9 natives of Tunis, and 7 Serbs; 31 were treated at one hospital and 7 at another. Ass serum was exclusively used, and was taken after the 30th, 60th, 80th, 99th and 103rd inoculations of the animal, these inoculations being repeated about every third or fourth day.

Out of the 38 patients treated, one only died. This patient was a French nurse who also suffered from tubercle, and death was unconnected with typhus. Among the Serbs, it was found that the typhus was relatively benign, with the result that only seven cases were treated and these were selected because their malady was of a severe type. Among the French, on the other hand, the typhus was of a very severe type and there were a large proportion of deaths before the treatment was introduced.

M. POTEL, a colleague of the authors, who had the treatment of many of the patients in his clinic, reported very favourably on the results of the treatment with serum, with respect to the following points:—

(1). Action on the temperature. In typhus cases treated according to former methods, there was a period during which the temperature remained at a level of about 40° C. In cases treated by serotherapy, this level did not appear or it ceased abruptly after the first injection.

(2). Action on nervous symptoms. In cases under serum treatment, stupor, delirium and prostration did not appear or rapidly disappeared. Other nervous symptoms such as insomnia or excitement soon lessened. Incontinence of the bowels and bladder, such as is common in the

second week of illness, was seldom observed, and the same applied to nervous dyspnoea, cutaneous hyperaesthesia, trembling of the lips and general tremors. Sacral sloughing, common in patients under ordinary treatment and usually of nervous origin, has generally been absent from patients who have benefited from the serum treatment.

(3). Action on the general condition. Owing to the absence of cerebral complications, the general condition was greatly ameliorated. The condition of the tongue remained good, the urine was abundant, the heart and the lungs were in good condition, while constipation was absent.

(4). Action on the length of illness. After one or two inoculations the number of patients in whom defervescence occurred after 6 to 12 days was numerous, 14 days being the usual time in cases under the old treatment. The average duration of the cases treated with serum was 11·61 days, as compared with the averages of 13·63 and 14·52 days obtained by previous workers using the older methods of treatment.

(5). Action on complications. None of the patients treated by serum presented any complication, a most unusual circumstance.

(6). Action on the severity of the illness. In typhus epidemics, the mortality has varied from 22 to 50 per cent. of the patients. The present authors have had a percentage of deaths less than 3 per cent., one patient only having succumbed out of 31 and that from inflammation of the lungs, and not from typhus. The curative action of the serum then, seems remarkably efficient.

The authors consider that it is important to commence serotherapy early in the infection, and the inoculations should be continued every two days until defervescence or a great amelioration in the condition of the patient occurs. 20 to 30 cc. of serum each day should be used. Hypodermic injections have always been used in the case of man.

Medical treatment to aid in the elimination of the toxic products from the body is used to aid the serotherapy. Abundant diuretic drinks, stimulants and tonics for the heart, and in very toxic cases the administration of artificial serum have been adopted. Baths have an antithermic action but have been used to increase the action of the skin, calm agitation, and procure a certain sensation of comfort.

Careful nursing is most essential.

The louse alone has been inculpatated in the transmission of typhus.

A. P.

ROESLER (Karl). *Die Autoserumtherapie bei Fleckfieber.*—*Wien. Klin. Woch.* 1916. Mar. 23. Vol. 29. No. 11. pp. 356–357. With 1 chart.

The author, who writes from a hospital at Troppau, has practised autoserotherapy in typhus for some time with good results. He describes three severe cases so treated. A long history of the patients is set forth. 80 to 100 cc. of blood were taken aseptically from a vein and mixed with one-tenth of its volume of 5 per cent. carbolic acid solution, being centrifuged prior to mixing. This mixture was injected intravenously, 2 to 3 cc. being used at first and then the quantity being increased by 1 cc. for subsequent injections. After two to three hours, there was a fall in temperature, and after four to six hours, profuse perspiration occurred.

The serum can be kept by being put up in ampoules.

A. P.

BOUYGUES (Julien). **Traitement du typhus exanthématique et du typhus récurrent par l'or et l'argent à l'état colloïdal.**—*Presse Méd.* 1916. Vol. 24. Sept. 7. No. 49. pp. 391-392. With 6 charts.

During the author's work at Biserta, there was an epidemic among the Serbian troops there, 150 cases of typhus being treated in hospital. There was no installation that could be used to provide baths for therapeutical purposes; the nursing staff was small, and time was important. A communication on the treatment of typhoid fever by the use of colloidal gold suggested to the author that this substance might be of use in typhus, where the external symptoms, the prostration and general symptoms were often like those of typhoid. Ordinary antithermic reagents had been found to exercise only a symptomatic action; the results obtained by the use of salvarsan were contradictory and the anti-exanthematic serum of NICOLLE and BLAIZOT could not be obtained. At first, colloidal silver in the form of electrargol only was obtainable; later, colloidal gold, in the form of gold collobiasis was procured and used.

Electrargol administered intramuscularly had no effect. Intravenous injections were much more efficacious. Ten cc. always was administered. In some patients a distinct, obvious action was observed half an hour after the injection. A drop in temperature of from 0.5° C. to 1° C. was found. Other patients showed no appreciable reaction, but in all cases there was an amelioration from day to day. Sleep returned, the congestion lessened, stupor disappeared, the tongue became moist, the pulse improved, and the patients at once felt better and asked for more injections. The drug modifies the temperature curve somewhat, but its antithermic action is uncertain. There is no doubt about its antitoxic action.

Gold collobiasis injections subcutaneously gave only feeble reactions. Intravenous injections, on the other hand, gave such violent reactions as to cause alarm at first. However, not the least ill effect was observed. A dose of 1 cc. of the collobiasis, or very rarely of 1.5 cc. was employed. Twenty minutes after the injection a reaction resembling a bad attack of malaria was seen. The patient shivered, his teeth chattered, sharp pains were felt all over the body, the attack lasting 20 to 25 minutes. A state of heat succeeded, with rise of temperature, sometimes up to 42° C. Then a stage of profuse sweating occurred, so that it was necessary to change the linen of the patient several times. The temperature fell from 1° C. to 2° C., and the pulse increased to 120 or 130 little by little. Pulse and temperature modifications were parallel.

In some patients the intravenous injection of gold was accompanied by frequent vomiting, sometimes persisting for four to six hours. In others there was a polymorphic erythema of a temporary nature, especially on the fore arm. Also after some injections there was a persistent tachycardia, imputed to the treatment rather than to the malady, as it was seen only in patients who had received inoculations of gold.

A strong reaction is, as a rule, preferable, and often indicates cure. If the reaction is weak, the prognosis is not good. The collobiasis always produced, from the next day, a rapid improvement in the condition, beginning about six to eight hours after injection. The treatment has not been used in cases presenting constant delirium, albuminuria, unconsciousness or grave symptoms. The insufficient

nursing staff did not permit of the treatment in cases other than those in which it seemed likely that a cure could not be accomplished spontaneously. After effects were rare; one only has been noticed, namely a feebleness of the heartbeat with cardiac weakness or myocarditis. Grave cardiac collapse has never been seen. Albuminuria existed in almost all the invalids, but was due to the generalised infection. Some of the patients were tuberculous, but the gold injections had no effect on the pulmonary lesions. The dangers of colloido-therapy have been exaggerated in the opinion of the author.

Several cases of relapsing fever have been studied. No salvarsan was available for treatment, so recourse was made to colloido-therapy. In all cases, the presence of spirochaetes was established by examination of the blood. All the patients were cured of spirochaetosis after injections of gold or silver. The reactions are the same as in the cases of typhus. The author makes no comparison between the results of the use of compounds of arsenic with those of gold or silver, but points out that the latter are of use, if the former are not available.

The author concludes that, in default of antiserum treatment, the injections of colloidal silver or gold should be used, and that this is useful where the installations do not permit the use of cold water treatments.

The charts show the effects of the treatments in five cases of typhus and in one of relapsing fever.

A. P.

VON LIEBERMANN (Theodor). **Ueber die Behandlung des Flecktyphus mit der Lumbalpunktion.** [The Treatment of Typhus by Lumbar Puncture.]—*München. Med. Woch.* 1916. May 2. Vol. 63. No. 18. pp. 657-659.

The author worked on typhus in Eastern Galicia. He has found that the removal of about 20 cc. of cerebro-spinal fluid by lumbar puncture reduced the cerebral symptoms and mostly induced somnolence, after which the rattling in the throat diminished, breathing and expectoration became normal and the livid colour of the skin disappeared. All this occurred within a few hours of the removal of the fluid.

Six cases are described, in five of which rapid recovery occurred.

A. P.

KLINK (A.) & SCHLESIES (E.). **Fleckfieberbeobachtungen.** [Observations on Typhus.]—*Berlin. Klin. Woch.* 1916. Feb. 21. Vol. 53. No. 8. pp. 178-185. With 21 curves and 1 text-fig.

The authors have observed 134 cases of typhus, some in a war prisoners' camp and some in an isolation hospital, and have devised a new treatment. The cases selected were divided into three groups, slight, moderately severe and severe cases. The patients received digitalis at the commencement of the illness. Later caffeine and camphor were administered. The further new treatment consisted in the giving of large doses of optochin. The drug was administered *per os* in keratin pearls, containing 0.25 grams of optochin, six or eight, and then ten times daily. In this way as much as 16 to 17 grams have been

administered and no bad result has been seen. Subcutaneous injections were also used. A solution of 0.25 cc. to 1.0 cc. of optochin in 5 cc. of camphor oil was prepared, and two to three injections were given daily, each of 0.25 to 0.5 grams of optochin. For intravenous inoculation smaller quantities were employed. In severe cases, 0.3 to 0.5 grams of optochin hydrochloride were given on three consecutive days in 20 cc. of physiological salt solution.

The best results were seen in the cases with severe nervous symptoms. Nine severe, 14 moderately severe and 23 slight cases were treated with optochin, 5 were treated with quinine, and 83 in other ways. Four of the patients died, two of whom had been treated with optochin. The total mortality was low, being about 3 per cent. The duration of the fever with the use of optochin was about 12 days, but with the use of heart stimulants and baths only, it lasted 14 days.

The curves show the effect of the optochin in producing a rapid fall of temperature.

A. P.

MUNK (Fritz). **Klinische Studien beim Fleckfieber.**—*Berlin. Klin. Woch.* 1916. May 15. Vol. 53. No. 20. pp. 527-530.

The present paper gives a general account of the familiar clinical symptoms of typhus. With regard to treatment, the author advocates the use of antipyretics, of digitalis for heart trouble, and of an intravenous infusion of 300 cc. of salt solution containing caffeine and adrenalin. In convalescence the use of strychnine has been found beneficial.

A. P.

KRUSCHEWSKY. **Fleckfieberbehandlung in einem Feldlazarett während des Winters.** [Treatment of Typhus in a Field Hospital in Winter.]—*München. Med. Woch.* 1916. May 30. Vol. 63. No. 22. pp. 808-809.

The author gives an account of 32 cases of typhus observed by him in a field hospital, five of which died. He used a "combined physical and medicament treatment." The whole body was washed with water at 18° C., the temperature being raised to 40° C. if the patients' condition were bad. For diarrhoea small enemata (a wine-glassful of warm water at 22° C.) were given, or one-third of a litre of water at 49° C. with a flavouring of red wine and then "bolus alba." For heart tonics, digitalin infusion or digipuratum was given. In some cases digitalin with tincture of valerian was used. A short description of the clinical features, embodying no new features, is given.

A. P.

ZEMANN (W.). **Komplikationen und Erkrankungen im Bereiche der oberen Luftwege und des Ohres bei Fleckfieber.** [Complications in the Region of the Upper Air Passages and Ear in Typhus.]—*Wien. Klin. Woch.* 1916. Aug. 10. Vol. 29. No. 32. pp. 1014-1015.

During a period of 18 months, the author has examined 137 cases of typhus in Belgrade. The greater number were men between the

ages of 19 and 42, in all 128. Seven women were also examined and two young people aged 13 and 17. Thirty-eight cases were watched throughout the course of the disease. All had affections of the upper air passages or of the ear. Such were not surprising, since all the organs are affected severely by typhus. Typhus often begins with inflammatory conditions of the throat, fever appearing two to three weeks after these preliminary signs. During the illness when the patient lies in deep stupor and breathes through the mouth, scabs and crusts form in the neighbourhood of the larynx. With the spread of the skin rash, however, an extension of exanthematous conditions to the mucous membrane of the upper air passages and mouth has not been observed. In very severe cases, necrotic changes in the uvula and tonsils were present. Rhinitis was found in all the patients for the first four to six days.

Later, there was great reddening of the nasal mucous membrane and nasal cavities. Suppuration occurred in acute cases. The frontal regions were affected in some cases, also the ethmoid and adjacent parts. In two chronic cases, an orbital complication occurred. Necrosis of the lateral nasal bones was not seen. In a few cases there was persistent nose bleeding after convalescence had set in.

The affection of the ears was in sympathy with the condition of the nose. Inflammation of the Eustachian tube and then of the middle ear with catarrh was produced. Sixty-eight cases of affection of the middle ear were observed. In 24 cases, there was acute inflammation with perforation of the drum. Permanent injury as a result of affection of the auditory nerve has not been encountered, nor has injury of the inner ear as a result of typhus been observed in the cases examined.

A. P.

BAUER (Erwin). **Zur Anatomie und Histologie des Flecktyphus.**—*München. Med. Woch.* 1916. Apr. 11. Vol. 63. No. 15. pp. 541-542. With 3 figs.

The present paper is largely confirmatory of the findings of FRAENKEL on the anatomy and histology of typhus. The author finds that the spleen is seldom enlarged, but is hard, with hyperplasia of the follicles. Typhus is characterised anatomically and histologically by systemic disease of the small, almost pre-capillary arteries. Degeneration due to proliferation and subsequent necrosis of the endothelial cells occurs.

The figures show the condition of an artery in the submucosa of the stomach, a part of the cortex of the kidney, and hyperplastic nodules in the spleen.

A. P.

LIPSCHUETZ (B.). **Klinische und mikroskopische Untersuchungen über Fleckfieber.** [Clinical and Microscopical Investigations in Typhus.]—*Wien. Klin. Woch.* 1916. May 4. Vol. 29. No. 18. pp. 549-553. With 3 charts.

The paper opens with a discussion of the different temperature curves seen in typhus. The author considers that the typical fever lasts 18 to 19 days. On the first or second day the temperature is

38° or 39°, on the third, fourth or fifth days, a rapid drop occurs, through 38°, 37° and even to 36·4° C. A pre-exanthematic period or initial stage of two to four days precedes the true exanthematous one.

During his work, the author found bodies in the polymorphonuclear leucocytes, like those that PROWAZEK found. The structures were mostly about 0·3 μ . The number varied with the stage of the disease. Out of 23 cases examined, 18 were positive, and 5 were negative. The Prowazek bodies were not found in the controls, which included cases of typhoid, variola and normal blood. The nature of the bodies may be problematic, but they may be of service for diagnosis.

A. P.

PENFOLD (W. J.). **Etiology of Typhus.**—*Trans. Soc. Trop. Med. & Hyg.* 1916. Feb. Vol. 9. No. 4. pp. 105–115. With 18 charts.

The author gives an account of his experiments on the causal agent of typhus, the results having been delayed in presentation owing to the appearance of PLOTZ's results. An analysis of the two successive papers by PLOTZ is given and the contradictory statements contained therein are set forth. Notes on the work of WILSON, HORT and INGRAM also are given.

Four typhus cases were examined by the author. In making cultures of the blood or urine, human blood agar was the most useful medium. "The bloods and urines yielded cultures on five occasions, and they were on each occasion pure cultures of a coccus." Cultivation results after 48 hours' cultivation, of the four cases, were as follows:—Case 1, a convalescent, gave no cultures. Case 2, convalescent, yielded no blood culture but a pure coccus culture from the urine. Bloods of cases 3 and 4, plated on peptone blood agar, gave pure plates of green colonies of a coccus. Plates of urines and bloods of cases 3 and 4 on human blood agar without peptone gave pure cultures of the coccus, but without the green ring round the colonies. The cocci were arranged in pairs or tetrads and were Gram positive. Subcultures to blood agar or serum agar were positive. The organism grew at room temperature and did not liquefy gelatine. The coccus is not injured by prolonged exposure to a low temperature, 2° C. The fermentation properties of the five cultures were tested on 21 media; all produced acid without gas. "Some time after isolation, these strains were not pathogenic for mice, rabbits or guinea-pigs."

Intraperitoneal inoculation of seven monkeys with blood from the patients was performed. Three monkeys inoculated from an acute case of typhus contracted the disease, and had "an incubation period of six days, with eight days of fever." Two monkeys inoculated from a patient at the crisis had longer incubation periods. A monkey inoculated from a nine days' convalescent had no definite fever, and one inoculated from a patient three days after the crisis had an incubation period of eleven days, and then ten days of fever with a remission. The cultures of the blood of monkeys inoculated from cases 3 and 4 gave a coccus like that obtained from the patients. Of two subinoculations of monkeys, one was positive. Two out of three monkeys inoculated with cultures isolated from patients contracted fever.

The author's summary and conclusions are as follows :—

Summary.

" 1. The same coccus was found in the blood and urine of two patients suffering from typhus, and also in the urine of a convalescent of nine days' standing.

" 2. European typhus blood causes the same types of fever reaction in monkeys as American and North African typhus.

" 3. The coccus above mentioned has been isolated from the blood of infected monkeys.

" 4. Fever has been produced after a six days' incubation by the inoculation of a pure culture of the above coccus into two monkeys.

" 5. The above coccus is fairly closely related to cocci described by other authors, as far as the published data admit of a comparison.

" 6. The coccus is not injured by prolonged exposure to low temperature, viz., + 2° C."

Conclusions.

" 1. The actual organism causing typhus is still not fully decided, but the balance of evidence available is in favour of its being due to a coccus.

" 2. The claims of PLOTZ to have discovered the cause of the disease are largely discounted by the contradictory nature of his publications.

" 3. Cocci have been found in the blood so frequently by independent and competent observers, that the use of these cocci tentatively as a prophylactic vaccine appears to be indicated."

A. P.

BLANC (Georges). **Recherches sur le typhus exanthématique poursuivies au Laboratoire de Nish d'avril à octobre 1915.**—*Bull. Soc. Path. Exot.* 1916. May. Vol. 9. No. 5. pp. 311-325.

The author gives an account of his experiences in the hospital at Nish at a time when the typhus epidemic was extremely severe, though on the decline. Overcrowding at the hospital was appalling. The centres of infection were the prison camps where Austrians were detained. The virulence of the epidemic was marked. Gangrene, noma, parotitis and meningeal forms abounded. The epidemic suddenly abated, benign cases became more frequent and from the end of May sporadic cases only occurred.

The experimental work showed that the typhus virus could undergo eight passages through guinea-pigs, the successive passages being indicated in a table. Twenty guinea-pigs in all were used; 13 definitely contracted typhus, one died of dysentery before the end of the incubation period, five showed an irregular high temperature that could not be interpreted, and in one case, the temperature could not be under observation. For a "normal virus" 1 gram of guinea-pig tissue was emulsified in 1 cc. of water. It was found that 22 cc. of a decinormal virus was the minimum infective dose. Attempts were made to prepare a vaccine against typhus—the work was interrupted and so incomplete. Two guinea-pigs did not contract typhus after vaccination and the control became infected, but general conclusions could not be made. Experiments on vaccine-therapy in man showed that such treatment was of most value in resistant cases. The cerebro-spinal fluid of men showing meningeal symptoms was found virulent to guinea-pigs. Examinations of the blood showed that there was a constant mononuclear leucocytosis. In contrast with the virus used by NICOLLE and BLAIZOT at Tunis [see this *Bulletin*, Vol. 7, p. 155], the Nish virus was weak and did not produce abortion of female guinea-pigs nor were the young born infected.

A. P.

da ROCHA-LIMA (H.). **Zur Aetiologie des Fleckfiebers.**—*Berlin. Klin. Woch.* 1916. May 22. Vol. 53. No. 21. pp. 567-569. With 3 figs.

The present paper contains an account of part of the work of the author and von PROWAZEK at the prison war camp at Kottbus, some account of the earlier work having already appeared. The workers found that 95 per cent. of typhus lice had microorganisms, not only in their alimentary canal contents, but especially in the epithelial cells of the alimentary tract. Such bodies were never found in typhus-free lice. Similar bodies have since been obtained by the present author from typhus lice from an outbreak at Wloclawek. The lice only become parasitised by ingesting infected blood. The bodies are somewhat bacteria-like or more like the Strongyloplasmata, i.e., Chlamydozoa. They are now named *Rickettsia prowazekii*.

Rickettsia prowazekii can penetrate the cells of the alimentary canal of the louse and can multiply actively there. The organisms are very small and are shortly elliptical or olive-like. They often lie in pairs. Abnormally short or long individuals have been seen. The parasite has been found only in the leucocytes of man.

Guinea-pigs were not infected, when inoculated with lice that had fed on patients, until the fifth day. Larvae of lice have been infected from the parent louse. The excrement of infected lice has not been found infective, so far.

A. P.

NOELLER (W.). **Beitrag zur Flecktyphusübertragung durch Läuse.** [Transmission of Typhus by Lice.]—*Berlin. Klin. Woch.* 1916. July 10. Vol. 53. No. 28. pp. 778-780.

The author has carried out some work on the transmission of typhus by lice. The etiological significance of *Rickettsia prowazekii* Rocha Lima is considered no longer doubtful. The author gives some account of his own work, mingled with that of other workers, so that it is not easy to distinguish exactly what is his own work. Human body lice were found not to live long on laboratory animals and consequently the cycle of the *Rickettsia* was difficult to follow. The human body louse bites the guinea-pig with difficulty, and dies in about three hours if kept at 32° C. The horse-louse sucks guinea-pigs also with difficulty, but lives rather longer. The pig-louse will live on a guinea-pig for two to three days at 30° C., but will live for six days at 16° C., or at lower temperatures. Pig-lice transferred from infected guinea-pigs to pig blood lived, the *Rickettsia* developed in them and the pig blood was not detrimental to the *Rickettsia*. Human infected body lice were found capable of living and breeding on pigs. The *Rickettsia* developed in them normally. Eggs from three infected body lice were hatched out and the larvae raised. No *Rickettsia* were found in the seven larvae examined. The author has not found cases of hereditary infection so far, though he thinks such cases are possible.

A. P.

NICOLLE (Charles). **Quelques faits ou observations d'ordre expérimental relatifs au typhus exanthématique, en particulier à l'entretien du virus par passages.**—*Bull. Soc. Path. Exot.* 1916. July. Vol. 9. No. 7. pp. 487-494. With 1 chart.

During the work on maintaining the passage of the typhus virus in animals, some interesting features have occurred. They are arranged by the author in groups, according to some special character presented, and so are not connected.

Two viruses have been passed through guinea-pigs during two years. The Algerian virus has had 68 passages, 43 being through guinea-pigs, while the Moroccan virus has had 66 passages, all but the initial one through guinea-pigs; 217 animals were used, all being inoculated intraperitoneally with the Moroccan virus, 2·5 cc. to 3 cc. of blood.

The temperature curve in positive infections was typical in 182 cases, in 18 cases the infection was abortive or doubtful, and in 17 no fever was seen; 83·88 per cent. of the experiments were successful.

The first 33 passages, made in the first year of work, gave 16 negative or doubtful results out of 98. The succeeding 32 passages in the next year gave 19 negative results out of 119. The influence of the number of passages appears to be nil. Monkeys inoculated with the blood of guinea-pigs at the 9th, 16th, 21st, 34th, 42nd and 61st passage of the Moroccan virus each showed severe typhus of the classical type. The virus of the guinea-pig seems fixed. Season had a little influence. In winter (January, February, and March) 19·64 per cent. of the failures occurred; in spring, 13·11 per cent.; in summer, 13·63 per cent.; and in autumn, 17·85 per cent. During periods of extreme heat, the guinea-pigs developed typical typhus. Under the influence of the sirocco, the temperature of the animals rose. If the sirocco lasted for several days, interpretation of the temperature curves became impossible.

The incubation period of the guinea-pigs varied from 5 to 21 days, 8 to 11 days being the most usual.

The possible influence of the day of illness on which the blood was taken was also investigated, and in the positive cases, the influence on the length of incubation. The results were divided into three categories in the positive cases—(i) precocious infection—incubation less than eight days, (ii) average incubation, 8 to 11 days, and (iii) retarded incubation, over 11 days. The results are incorporated in the following table :—

	Negative.	Positive.	Early.	Inter- mediate.	Late.
Total ..	16·12	83·88	14·83	67·58	17·58
1st day ..	30	70	14·28	71·42	14·28
2nd day ..	15·38	84·62	11·36	75	13·63
3rd day ..	12·06	87·94	9·80	64·70	25·49
4th day ..	16·27	83·73	19·44	58·33	22·22
5th day ..	17·07	82·93	23·54	67·64	8·82
6th, 7th and 8th day ..	18·18	81·82	11·11	66·66	22·22

The duration of the incubation period does not seem to be related to the day on which the blood was taken, but to variations impossible

to estimate in the activity of the virus and in the resistance of the guinea-pig.

From experiments it was found that all organs of an infected animal were infective. The spleen was not preferable to blood for inoculation. The bone marrow had equal infective power to blood, while emulsions of the suprarenal capsules and brain seemed more virulent.

One case of intravenous and two of intracerebral inoculation of guinea-pigs have been observed. The author thinks that intracerebral inoculations will probably be of use in obtaining passages when the material for inoculation is limited.

Guinea-pigs born of parents one or both of which had been cured of typhus were found not to be immune. The immunity of a monkey once cured or recovered of typhus is doubtful.

Apart from sero-therapeutical results, the action of certain medications, given subcutaneously, has been tested. Pyocyanine was without action but very toxic. Formol was inactive. Salicylate of soda, either in one dose of 0.25 cgm. or daily for two to four days of 0.10 cgm. led to lowering of the temperature, but the temperature returned the day after inoculation. The drug was given to some Serbs in doses of 4 to 8 gm. per day by the mouth, but it appeared to have no effect.

A. P.

RABINOWITSCH (Marcus). Біологіческія реакції—агглютинація и связываніе комплемента—при сыпномъ тифѣ. [Biological Reactions—Agglutination and Complement Fixation—in Typhus Exanthematicus.]—17 pp. 1916. Charcow.*

Under this title, Dr. Rabinowitsch gives the results of his researches on the complement fixation and agglutination of the serum of typhus patients, the parasites of which disease he named *Diplobacillus exanthematicus*. He also criticises the opinions of other workers on the subject.

Dr. Rabinowitsch continued his researches after having obtained from the blood of patients cultures that were very virulent, which, after numerous passages through guinea-pigs and re-sowings on artificial media, gave a clear culture yielding homogeneous suspensions of the organisms. These cultures yielded antigens of different activities, and often the same serum gave antigens of different activity. Consequently, agglutination and complement fixation experiments were made at the same time. The technique for the agglutination reaction was as follows:—For the agglutinin, the culture from a solid medium was used. It was suspended in distilled water or in 2 to 7 cc. of normal saline, according to quantity. Three to four drops of a thick suspension of the culture from a case of suspected typhus was mixed with 1 cc. of the serum of the patient, while as controls, the same quantity was tested with the serum of patients suffering from other maladies or with normal saline. The test specimens were kept for one hour at 37° C., and then were examined under the microscope.

A table giving the results of 63 serums examined in 1913–1914 shows that agglutination was obtained in 52 cases with the *Diplobacillus*.

* Translated from a summary in French made by Dr. KELLIN.

The results obtained in the experiments depend on the phase of the malady at which the serum is obtained. In 42 cases in which serum was obtained at the paroxysm, nine gave positive results. Five experiments made at the crisis gave three positive. Of 98 experiments made at different periods of the apyrexia 87 were positive. Comparing the results of agglutination tests with those of complement fixation, no constant agreement was found. This favours the hypothesis that each of these reactions depends on special antigens. Complement fixation reactions were made at the same time with active and inactive serum. Watery extract of cultures of the *Diplobacillus* were used as antigen, since extracts in ether, alcohol and acetone gave negative results. Bacilli from five different sources were sown on ascitic agar in test-tubes and kept 24 hours in an incubator. The cultures were treated with 3 to 5 cc. of sterile salt solution, according to the abundance of growth obtained. All these cultures from the same source were put in a larger vessel and kept in the incubator, and were shaken up for four days, at each half hour during the day. They were then placed in a rocking apparatus, after which the suspension of bacilli placed in sterile test-tubes was centrifuged for five minutes. An opaque liquid separated from the sediment and, added to 0.25 per cent. carbolic acid, was dissolved in physiological salt solution, and used in doses of 0.25, 0.1, or 0.2 cc. as antigen for the tests. To this antigen, diluted in 1 cc. of normal saline, 0.1 and 0.2 cc. of active serum or serum inactivated by half an hour at 5° C. were added, and the complement titrated with the antigen corresponding to the titre + 0.002 cc. Salt solution was added to the test-tubes in order to bring the level of each to 3 cc.; the tubes were shaken and left for half an hour at room temperature or for $\frac{3}{4}$ hour in the incubator. To each test-tube 2 cc. of haemolytic solution was added. This was prepared from red corpuscles of sheep, sensitised by amboceptor taken from a rabbit immunised from the sheep, and after being shaken, it was kept for two hours in the incubator, then left for an hour at room temperature, and finally put on ice till the next day. In 51 cases out of 62 examined the fixation reaction was obtained. Of these, 19 positive out of 42 were tested at the paroxysm, three out of five taken at the crisis were positive, while 81 out of 98 tested at the commencement of apyrexia also yielded positive results. Controls using the serum of relapsing fever, typhoid, tubercle, syphilis, etc. gave no fixation of complement with extracts of *Diplobacillus exanthematicus*. Also, the serum of typhus patients did not agglutinate with the typhoid bacillus, paratyphoid A and B, streptococci, etc.

While the agglutination reactions and fixation have no great practical value, as they appear only at the crisis or during apyrexia, they are of value, since they show that *Diplobacillus exanthematicus* is the etiologic agent of typhus, thereby confirming the evidence afforded by its staining reaction, its cultures, its morphology, and its pathogenic action.

A. P.

PANETH (L.). **Züchtung des *Bacterium typhi-exanthematici* nach Plotz, Oltitzky und Baehr.** [Culture of *B. typhi-exanthematici*.] —*Med. Klinik.* 1916. June 11. No. 24. pp. 647-648.

The author states that the culture of *B. typhi-exanthematici* is not difficult but needs care. The following medium was used :—

Distilled water	3,000 grams.
Liebig's Meat extract	12 „
Na Cl	15 „
Peptone (Witte)	30 „
Normal sulphuric acid	17.5 cc.

(These constituents are mixed together, care being taken to prevent clotting).

Agar	85 grams
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is then added. The mixture is then allowed to stand for an hour before being incubated for two hours. It is then filtered, and a mixture of the white of eight eggs in 150 cc. distilled water is added.

Culture tubes were kept at 37° C. The earliest colonies occurred on the 5th day; more were present on the 10th and 12th days, and some appeared up to 21 days. The colonies presented the morphology and reactions of *B. typhi-exanthematici*, and their agglutination reactions were identical.

A. P.

WEIL (E.) & FELIX (A.). **Ueber die Beziehungen der Gruber-Widalschen Reaktion zum Fleckfieber.** [The Relation of the Widal Reaction to Typhus.] —*Wien. Klin. Woch.* 1916. Aug. 3. Vol. 29. No. 31. pp. 974-978.

The authors have made some observations on the Gruber-Widal reaction in cases of typhus fever, serological and bacteriological results being in disagreement in some cases. The cases were divided into three groups. The first group included inoculated persons already possessing a positive Gruber-Widal reaction, in whom during the typhus the reaction was increased; the second included patients in whom the reaction due to inoculation had disappeared but reappeared during typhus; while the third class consisted of persons who had never been inoculated, yet showed a positive Gruber-Widal reaction.

With regard to inoculated persons, 15 out of 28 cases presented an increase of the serological titre, they having a positive reaction when first examined. Of the second group, 18 out of 55 patients gave a positive reaction. Of 22 cases of non-inoculated persons, four showed a positive reaction.

An increase in the serological titre was found to exist, not only in typhus, but also in such diseases as tubercle, malaria, pneumonia, and haemorrhagic nephritis. A table illustrating this increase is given.

Non-inoculated persons showed a positive reaction in 18 per cent. of the cases examined, 12 out of 67 being positive.

As a result of the investigations of the authors, it is concluded that, the Gruber-Widal reaction is not specific and that its value is, in consequence, lessened.

A. P.

LOEWY (Otto). **Hautveränderungen bei Meerschweinchenfleckttyphus.** [Skin Lesions in Typhus of Guinea-Pigs.]—*Wien. Klin. Woch.* 1916. May 4. Vol. 29. No. 18. pp. 547-548. With 3 figs.

The following phenomena have been seen in guinea-pigs infected with typhus:—Dropsy of the gall bladder, liver obstruction, and localised small-celled infiltration. Oedema of the urinary bladder with infiltration of the bloodvessels also occurred. Six out of 25 animals showed a rash, the spots being large, about the size of a linseed, with an ill-defined edge, rose to red in colour, with a brown or livid blue tint. The middle of the spot was dark red. Macroscopically, the spots resembled those of human typhus. The number seen in the different animals varied. Endothelial degeneration and small-celled infiltration was seen in sections of the skin of the guinea-pigs. The infiltration may be in the form of strands.

The photomicrographs show sections of the skin of the guinea-pig infected with typhus.

A. P.

PIERCE (C. C.). **Typhus Fever: Prevention and Control.**—*Texas State Jl. Med.* 1916. Aug. Vol. 12. No. 4. pp. 182-183.

This paper commences with a short outline of the history of typhus and shows that typhus exanthematicus of Europe, tabardillo or Mexican typhus, and Brill's disease are all forms of one malady, typhus. The author considers that typhus in a mild form has been endemic in Texas for years, especially in the western part of the state and along the Mexican border. Sixty-eight cases of typhus were reported to him between December 14th, 1915 and April 30th, 1916, in Texas, 40 being from the El Paso County. Almost all the cases developed in persons recently returned from Mexico. Fourteen ended fatally, ten of the fatal cases being persons above 40 years old.

The symptoms of typhus as seen in Texas are described. The author states that the description of the clinical symptoms may be somewhat different from that found in textbooks, but as similar descriptions have been printed in this *Bulletin* before [see Vol. 7, pp. 142-143] they need not be repeated.

"To prevent typhus from spreading only one thing is necessary—eliminate lice." How this elimination may be brought about is set forth in a series of "Rules to avoid typhus," which are very practical. They are as follows:—

"1. Typhus is a serious disease, giving a death-rate of from 8 to 30 per cent.

"2. Typhus is contagious, the contagion being transmitted only by lice that have bitten a person sick with typhus fever and later bite a well person. The body louse, or white louse, is the most dangerous one; more so than the head louse.

"3. As it is not possible to know which lice are infected with typhus fever, all lice should be destroyed.

"4. Persons sick with typhus are not dangerous, as spreaders of the disease, unless they have lice on their bodies.

"5. All persons should, however, keep away from one sick with typhus; in order to avoid the bites of lice, if any should be present.

"6. Convalescents from typhus are not dangerous 36 hours after their temperature returns to normal, as they then cannot infect lice, so they need not be quarantined.

"7. Avoid coming into contact with dirty persons who may carry lice in their clothing. It is unwise, therefore, to visit shows, or other crowded places or ride in street cars when typhus is present, as lice may be transferred from one person to another.

"8. It is easy to get rid of lice because they live only in contact with human beings, on whose blood they feed and in whose clothes they live and deposit their eggs.

"9. Any person that develops typhus fever should be thoroughly disinfected by having the hair cut short and the body bathed with soap and warm water or kerosene oil. All clothing should be destroyed by burning, or disinfected by boiling for at least five minutes, or by being submerged in gasoline for five minutes.

"10. All persons who are lice infested, whether sick or not, can be freed from lice by undressing and taking a bath with warm water and soap, or with gasoline, or equal parts of kerosene and vinegar. While they are undressed their clothes should be boiled for not less than five minutes.

"11. Clothing that is boiled each week will remain free from lice. Ironing clothing will also kill lice eggs that are attached to the seams and folds of the garments. A person who bathes two or three times a week and changes underclothes at least once each week, cannot become lice infested, if the clothes are boiled when they are washed.

"12. To get rid of head lice, tincture of Larkspur or Stavesacre may be used, or the head may be soaked with equal parts, kerosene and vinegar, for half hour and then washed with warm water and soap; repeat if necessary. Men and boys should have their hair clipped, after which simple washing is sufficient."

A. P.

HEYMANN (Bruno). *Beiträge zur Frage von der Beteiligung der Kopflaus an der Fleckfieber-Verbreitung.* [The Part taken by the Head Louse in the Spread of Typhus.]—*Med. Klinik.* 1916. Apr. 30. Vol. 12. No. 18. pp. 480-488.

The author states that the head and body lice are very similar but not identical insects, and gives a number of minute points of difference between them. He discusses whether head lice are concerned in the transmission of typhus fever, citing the opinions of several authorities. No final conclusion seems to have been reached.

A part of the paper is devoted to refuting the idea [now abandoned by most authorities] that typhus is a tropical malady.

A. P.

CHOLERA.

ELKINGTON (J. S. C.). **Asiatic Cholera.**—*Commonwealth of Australia. Quarantine Service Publication No. 7.*—80 pp. With 1 map. 1916. Melbourne: Government Printer.

This publication is one of a series issued by the Australian Commonwealth chiefly for the information of quarantine officers, but also of great use to anyone desiring a reliable compendium on the subject, and consists of some 59 pages divided under the following headings:—History, clinical features, bacteriology, therapy, epidemiology, carriers, prophylaxis. The pamphlet being of a didactic nature does not discuss the relative merits of the more recent cholera media and diagnostic methods; each section is supplied with a bibliography. A transcript of the Report of the Sub-committee on Cholera to the International Sanitary Conference of 1912 is appended, together with a list of the places infected with cholera from 1909-1914.

H. Schütze.

LEVI della VIDA (Mario). **Alcune osservazioni di profilassi anticolerica in un Ospedale militare contumaciale.** [Cholera Prophylaxis in a Military Quarantine Hospital.]—*Ann. d'Igiene.* 1916. Oct. 31. Vol. 26. No. 10. pp. 631-641.

Between 1st October and 3rd December 1915, 11,755 stool examinations were carried out in this quarantine hospital. The method chiefly relied upon was peptone water enrichment for 10-12 hours with subsequent microscopical examination for comma bacilli; from the cultures giving positive or doubtful pictures, films were again prepared and if a positive resulted for the second time, the case was transferred to the "infected" ward; if the film was still doubtful, a second peptone was subcultured. The author does not consider Dieudonné altogether superior to the peptone water enrichment, as it is not so simple and more easily leads to confusion in the diagnosis owing to alterations in morphology that occur with growth on the alkaline blood medium. Bandi's method is useful when a particularly rapid (3-4 hours) diagnosis is wanted.

The author isolated the vibrio in all early cases and occasionally, as a control, in later ones and carried out the agglutination test, but came at last to trust entirely to a practised recognition of the Koch bacillus under the microscope.

From 56 convalescents vibrios were isolated in:—

68	per cent.	for less than 7 days.
25	„	for 7-14 days.
7	„	for over 14 days.

From 278 healthy persons vibrios were isolated in:—

90	per cent.	for less than 7 days.
9	„	for 7-14 days.
1	„	for over 14 days.

The longest period of convalescent carrying was 25 days and of healthy carrying 23 days.

A point noticed was that none of those carrying for a longer period (over 14 days) was an inoculated person, but the smallness of the numbers prevented a conclusion from being drawn.

All sick or wounded soldiers coming from a cholera infected zone, and sent out of the first line hospitals because they would require more than a few days' treatment, have in Italy to pass into a quarantine hospital for at least six days.

Neither room nor equipment made it possible for an ideal system of segregation to be arranged. As cases developed among the inmates of the hospital or carriers were detected, they were sent into an "infected" ward, the actual cholera patients being segregated at one end and separated from the carriers by a barrier. When a negative bacteriological return was obtained the soldiers were transferred to an observation ward for a further bacteriological examination (perhaps two) carried out after the administration of a saline purge, and from here drafted to the ordinary military hospitals.

H. S.

de SANDRO (Domenico). **Osservazioni sopra una piccola epidemia di col'era.** [A Small Cholera Epidemic.]—*Ann. d'Igiene.* 1916. Oct. 31. Vol. 26. No. 10. pp. 642-646.

An account of a small epidemic apparently spreading from healthy soldiers, stationed in a theatre at Taranto and recently returned from an infected frontier, and infecting a neighbouring family. The father and daughter in this family have attacks of diarrhoea and vomiting without the cases being diagnosed; subsequently the son of seven years, becoming seriously ill with the same symptoms, is taken to hospital and ultimately diagnosed as a cholera case, an inagglutinable *V. cholerae* being isolated. Before the boy could be quarantined, the infection has spread to two other patients in the same ward.

The three cases all ended fatally and the author is inclined to see a rapid rise in the virulence of the vibrio by passage from the healthy soldier carrier through the mildly attacked father and daughter to the severely ill son and the two almost fulminant cases infected in the ward.

H. S.

de RAADT (O. L. E.). **Eenige beschouwingen naar aanleiding van de verhandeling van den heer P. C. Flu "Epidemiologische studien over de cholera te Batavia 1909-1915."** [Observations on the Paper by P. C. Flu: "Epidemiological Studies on Cholera in Batavia 1909-1915."]—*Geneesk. Tijdschr. v. Nederl-Indië.* 1916. Vol. 56. No. 3. pp. 237-243.

FLU (P. C.). **Enkele opmerkingen naar aanleiding van de "beschouwingen" van Dr. de Raadt.** [A Few Remarks on the "Observations" by Dr. de Raadt.]—*Ibid.* pp. 244-256.

De Raadt reviewing Flu's paper [this *Bulletin*, Vol. 8, p. 151] puts two questions:—(1) Is the site where cholera vibrios are conserved chiefly to be sought in the intestine of convalescent carriers or of healthy carriers? (2) Which is the best method of examining suspects in large numbers?

Citing a number of authors de Raadt declares that the important infecting agents are the healthy carriers, as only these are generally found carrying *V. cholerae* for a considerable period. He regards inoculation of great use in ridding the intestine of the parasitic cholera vibrio and advocates a modified form of BANDI'S method as suitable and reliable in the examination of large numbers of people for carriers. This method consists in inoculating from the peptone water culture made with the suspected faeces, into peptone water containing agglutinating serum; agglutination goes on simultaneously with growth. With this method the author says all carriers could be detected at the ports and so prevented from landing and communicating the disease.

Flu, replying to this paper, complains that de Raadt has done no original work to support his claims, but relies upon quotations from other workers entirely; some of these authors and a number of others (KOLLE, LENZ, GOTSCHLICH, GAFFKY, etc.) are then cited in long passages to prove that he (Flu) has confirmation for his statement that convalescents may carry for many months and serve as links between epidemics.

Flu complains too that the method of quick diagnosis recommended by de Raadt is practically untested and that there is no proof that inoculation will cure the carrier condition; he cites BABES to that effect.

In conclusion Flu decides that safety from cholera infection is not to be sought as the result of a thorough search for carriers in the various shipping centres, even though it were possible to detect every carrier. The search for carriers should not be regarded as the cardinal feature of the campaign but merely as an important one. The best guarantee will always be a good and sufficient supply of drinking and bathing water (not only for the Europeans in the Dutch East Indies but for the native inhabitants as well) and a reliable system for the disposal of sewage.

H. S.

BERTARELLI (E.). **La diagnosi sperimentali del colera e le lacune del metodo ufficiale.** [The Bacteriological Diagnosis of Cholera; Defects in the Recognised Methods.]—*Morgagni*. 1916. Vol. 58. Pt. 2. Jan. 11. No. 3. pp. 43-47.

A short review in essay form of the current bacteriological methods for the diagnosis of cholera. Two questions are put, viz. :—(a) Can the present methods be relied upon to find *V. cholerae* in every case of Asiatic cholera; and (b) is it likely that *V. cholerae* may be wrongly diagnosed or, *vice versa*, non-cholera organisms diagnosed as the true Koch bacillus?

The author decides (a) that the cases of cholera not bacteriologically verified are very few in number and are not to be regarded as proving the present methods untrustworthy; (b) that an organism which is not *V. cholerae* cannot possibly succeed in masquerading as such, and that though, on the other hand, what is apparently a true Koch bacillus may not fulfil every test required of it, e.g., agglutination, still on the whole the diagnosis of cholera, as usually carried out, is sufficiently reliable.

H. S.

KAUP (J.). Weitere Erfahrungen und Studien über den Wert und die Wirkungsdauer der Choleraschutzimpfung. [The Value of Prophylactic Cholera Inoculation and the Duration of the Protection thus Afforded.]—*München. Med. Woch.* 1916. July 25. Vol. 63. No. 30. pp. 1093-1095.

The author runs through a number of previously published papers, showing the protective value of cholera vaccine and the influence of inoculation on the course and outcome of the disease, finding that immunity seems to be quickly (5-8 days) established.

While KOLLE considered that protection would last for a year or more, others have called his statement in question and consider even six months, laid down by Grecian authorities, too long a period, particularly if those inoculated have been through strenuous times and have not been fed or cared for too well. Reinoculation, according to these, should take place every three months, if the troops are in an infected neighbourhood.

Among the very few figures given in this paper in support of these statements are the following :—

Of 174 bacteriologically diagnosed cases, 39 per cent. had been inoculated within three months and 61 per cent. more than three months previously. [No idea is given of the total numbers of the more and the less recently inoculated, so that these figures go for nothing.] Among the more recently inoculated the case mortality was only 13 per cent., among the less recently inoculated on the other hand 40 per cent.

The author attempted to follow the bacteriolysin and agglutinin curves in a few (5-15) inoculated soldiers, in order to establish the length of time these bodies persist after inoculation, but the smallness of the numbers examined and the big individual differences make his results of little value. Complement fixation was obtained in several cases, the complement fixing bodies apparently appearing very soon after inoculation and disappearing again after 2-3 weeks in most cases, although they were still found as long as 4-5 months after inoculation in one or two cases.

H. S.

ERDHEIM (J.) & SCHOPPER (K. J.). Cholerabekämpfung. [Anti-Cholera Measures.]—*Wien. Klin. Woch.* 1916. June 22. Vol. 29. No. 25. pp. 769-773.

As the result of observations made during the course of a cholera outbreak occurring in a camp of some 3,500 Serbian prisoners, the author comes to the following conclusions.

Hygienic measures must be rigorously enforced and inoculation immediately undertaken.

It is not to be feared that inoculation carried out during an epidemic may have an ill effect; neither the morbidity nor mortality is unfavourably influenced. One may expect the epidemic to be brought to a close 8-14 days after the last inoculation; the number of carriers should also sink rapidly to zero. If possible, the stools of all suspected persons should be examined and the carriers segregated.

To facilitate the working out of such a plan, it is advisable to group the individuals, each group to inhabit separate quarters (huts, different floors of the same building, etc.), and live entirely independently, so that examination may take place and the individuals be released from quarantine in batches.

H. S.

KNOPF (Eduard). Ueber den Verlauf der Choleraerkrankungen im Gefangenenerlager X. [The Course of the Cholera Epidemic in the Prisoners' Camp X.]—*München. Med. Woch.* 1916. Aug. 15. Vol. 63. No. 33. pp. 1207-1209. With 3 text-figs.

A short account of 35 cholera cases that occurred among some 2,500 Russian prisoners arriving at the German internment camp in a collapsed condition after their difficult retreat. Within eight days the epidemic was brought to a standstill, for which the author considers isolation and measures of personal cleanliness chiefly responsible. Bolus alba and intravenous saline injections were included in the therapy, the former giving very good results. MORGENROTH's preparation—isoamylhydrocupreine—was tried in a few cases but the most that the author can say for it is that he noticed no ill effects.

H. S.

GALAMBOS (A.). Erfahrungen über die Cholera asiatica.—*Therap. d. Gegenw.* 1915. Vol. 56. pp. 452-456.

With an experience of some 89 cases of cholera, the author describes the usual, well known symptoms met with in the disease; the intravenous administration of hypertonic saline solution is considered the only successful therapy. Except in two or three cases the vibrios disappeared from the stools in 7-8 days; in the exceptions they were found for 2-3 weeks; whether the carriers or slight cases received Carbo animalis, Bolus alba, castor oil or no treatment at all apparently made no difference to the length of time the vibrios remained in the faeces of the patients.

H. S.

SOUCEK (Alfred). Ueber das Exanthem bei der Cholera asiatica. [The Cholera Eruption.]—*Wien. Med. Woch.* 1916. Mar. 18. Vol. 66. No. 12. p. 428.

In a cholera epidemic on the eastern front, cholera rashes were often observed. One fourth of the cases were of a urticarial nature, the remainder being like the eruption in measles. This latter type first appears on the face, spreading in 1-3 days over the body and limbs; the conjunctivae are occasionally injected but the mucous membrane of the mouth is never affected and there is no coryza or cough and no enlargement of any glands. The diagnosis as against measles was always easily made. While the urticarial type of cholera rash generally appears about the fifth or sixth day of the disease, the macular form is not usually seen until the ninth to twelfth; after three to six days the rash tends to disappear.

The author remarks on the similarity between the cholera and the serum rash and suggests the possibility of the cholera rash being due to anaphylaxis. Both slight and severe cases had the eruption, but generally the time of its appearance coincided with an improvement in the patient's condition.

H. S.

MAJUMDAR (S. K.). **Intravenous Saline in Cholera—A Contra-Indication.** [Correspondence.]—*Indian Med. Gaz.* 1916. May. Vol. 51. No. 5. p. 195.

Having noticed certain pulseless cholera cases that do not respond to intravenous saline injections, the writer suggests that in these there is no marked deficiency in the quantity of fluid in the blood vessels but that the absence of radial pulse is rather due to loss of vascular tone and cardiac weakness, the result of the toxæmia. The introduction of extra fluid into the circulatory system would in such a case only embarrass an already weakened heart. The specific gravity of the blood is therefore a better guide as to the necessity for intravenous saline injections and should the outfit for this be wanting the writer recommends the following as a test whether the veins are full or not :—
“ If on holding the arm just above and below the elbow, the veins at the bend of the elbow become fairly turgid on application of some extra pressure inwards (i.e., towards the bend of the elbow), the case should not be given any intravenous injection,” the implication being that there is already enough fluid in the circulatory system.

H. S.

MAROCCHO (Giovanni). **Agglutinazione dei germi per mezzo di sieri essiccati e dosati, con speciale applicazione alla diagnosi del colera.** [The Use of Dried Serum for Cholera Agglutination.]—*Giorn. d. R. Accad. Med. di Torino.* 1916. Mar.-Apr. Vol. 79. No. 3-4. pp. 185-190. With 1 text-fig.

The paper advocates the use of agglutinating serum dried in suitable amounts on cover slips, as a simplification of the usual method of carrying out the diagnostic agglutination test where full laboratory resources are not available, and emphasises the importance of any practitioner being able to decide without delay whether a suspected stool contains cholera organisms or not.

The coverslips supplied would have been prepared by drying on each at 37° C. one centigramme of cholera agglutinating serum so that on washing off in 10 cc. liquid, a concentration of 1 : 1,000 would result ; with 20 cc. the concentration would be 1 : 2,000 and so on.

The serum on such coverslips retains, according to the author, its titre well, if kept dry and in the dark, e.g., wrapped in blotting paper and enclosed in a metal box or glass bottle.

The method recommended is to carry out the agglutination either in peptone water inoculated with the suspected faeces or in a peptone water subculture from this and after growth has advanced as far as general turbidity. Into the peptone water tube of 10 or 20 cc., according to the serum concentration desired, a coverslip holding dried serum is dropped ; with a little shaking the serum dissolves. After two hours' incubation marked agglutination will be evident, especially in those tubes which were subcultures from a first enriching peptone water. [No idea of the limitations of this simple and apparently effective method is given and of how completely resolution of the serum dried on coverslips takes place.]

H. S.

GIBSON (H. Graeme). **A New Solid Medium for the Isolation of the Cholera Vibrio.**—*Brit. Med. Jl.* 1916. Sept. 30. pp. 454–455.

This medium consists of agar 30 grams, peptone 10 grams, starch 10 grams, and sod. bicarb. 1·5 grams, litmus, water to 1,000 cc., the starch being added after solution and clarification of the other ingredients and the litmus after sterilisation, which should be by the fractional method; the final reaction is about –2 to phenolphthalein.

As the comma bacillus attacks starch with the formation of acid, cholera colonies growing on this medium are distinguishable from all others, except certain diphtheroids and water vibrios which also attack starch though not so rapidly, by acquiring a faint pink colour. Faeces are plated directly out on the medium and a search made for pink colonies at the end of 18 hours. [No evidence is brought as to any selective powers possessed by the medium. A somewhat similar medium, but without the addition of litmus has been advocated by LANGE [this *Bulletin*, Vol. 6, p. 499] and criticised by BOETTCHER [*ibid.* Vol. 7, p. 239].

H. S.

AZZI (Azzo). **Reazioni de vibrione de colera e di altri germi con sostanze coleranti decolorate.** [Colour Reactions of *V. cholerae* and Other Organisms.]—*Riforma Med.* 1916. Aug. 21. Vol. 32. No. 34. pp. 921–924.

The paper deals with an attempt to find a dye giving a specific reaction with the cholera vibrio.

The comparative experiments were carried out with a variety of intestinal organisms, including a number of cholera-like vibrios. [The organisms were unfortunately used in pure cultures only and no attempt was made to carry out the tests with cholera faeces, even those artificially prepared.] Of the dyes employed only fuchsin and crystal violet proved of any use.

On Aronson's medium, which contains fuchsin decolourised with sodium sulphite, *V. cholerae* and Gärtner's bacillus gave red colonies, while other organisms showed only more or less pink ones.

If, however, the fuchsin is replaced by crystal violet (0·1 cc. of a one per mille crystal violet solution decolourised with about 15 cc. 10 per cent. sodium sulphite) the colonies of *V. cholerae* and a number of other intestinal organisms take on a blue colour, while Gärtner colonies remain colourless. [Thus by using the two media *V. cholerae* should be diagnosable when in pure culture, but with an unknown mixture of colonies there would obviously be no specificity in the media].

An alternate method evolved was to plate out the organisms on ordinary agar and run over them, when grown, a few drops of colouring matter decolourised with either sulphur dioxide or sodium sulphite, observing after a few minutes which colonies recolourised the stain employed. A 0·1 per cent. aqueous solution of dye with enough 10 per cent. sodium sulphite or saturated sulphur dioxide solution to decolourise was used.

Here again basic fuchsin and crystal violet were the dyes proving useful; the former decolourised with either sodium sulphite or sulphur dioxide coloured both cholera and Gärtner colonies red, turning others

but faintly pink ; crystal violet decolourised with sodium sulphite stains *V. cholerae* and *B. coli* colonies pale blue at the periphery, but leaves Gärtner colourless.

In a mixed plate of cholera and Gärtner with a mixture of the crystal violet and fuchsin solutions (one part of the former to five of the latter) poured over it, the cholera colonies became blue and the Gärtner red. [It is not stated if *B. coli* would, as one might expect, behave similarly to *V. cholerae*.]

By observing that no recolourising powers attach to filtrates of *V. cholerae* broth cultures, but do, on the other hand, to the washed bodies of the vibrios, the author decides that the reaction obtained with decolourised fuchsin and crystal violet is not a vital process, that the bacteriological substance taking part in it is not to be found outside of the vibrio itself but intimately bound up with its protoplasm, and that as the nucleo-proteid extracted from the cholera vibrios according to LUSTIG and GALEOTTI, gives the reaction, the substance in question is in some way connected with the nucleo-proteids.

H. S.

KUHN (Philaethes). **Weitere Mitteilung über den Nachweis von Typhus, Ruhr, und Cholera durch das Bolusverfahren.** [A Further Communication on the Isolation of Typhoid, Dysentery and Cholera Organisms by Means of Bolus alba.]—*Med. Klinik.* 1916. Sept. 3. Vol. 12. No. 36. pp. 941-942.

The method advocated consists in emulsifying the specimen, if a stool, in sterile saline and filtering through cotton wool ; of the filtrate 4-5 cc. is taken in a tube and shaken with 0.02 gramme bolus alba ; on standing for two minutes or so the bolus alba settles to the bottom of the tube ; the supernatant is then pipetted off and the sediment after having been broken up in a couple of drops of saline is spread over a malachite green and then an Endo plate.

As microscopically it has been seen that cholera vibrios are strongly absorbed by bolus, the author expects that good results will be obtained by this method in the isolation of the comma bacillus, as has been the case with typhoid and dysentery. The author in a series of some 398 examinations found the positive typhoid diagnosis increase by 19 per cent. when the bolus method was used and in dysentery almost doubled his results.

H. S.

LANAS (L.). **Estudio comparativo entre los vibriones del cólera y los vibriones de "El Tor."** [A Comparative Study of Cholera and El Tor Vibrios.]—*Bol. Inst. Nac. Higiene de Alfonso XIII.* 1916. Sept. 30. Vol. 12. No. 47. pp. 131-163.

The author puts two El Tor vibrios received from Alexandria and two Koch vibrios through a series of tests and finds noticeable differences only in the milk cultures, in the haemolytic and the immunity reactions. The El Tor strains coagulated milk in 9 and 20 days respectively ; with the cholera milk did not clot even after 30 days, though, as a certain amount of acid is produced, the author considers this difference more a quantitative than a qualitative one.

The vibrios were tested for haemolysis by growing in peptone water plus 5 or 10 per cent. defibrinated goat's or sheep's blood for as long as three days; the El Tors haemolysed, the choleras did not; however, only three years previously one of the cholera cultures had been haemolytic, which shows that the characteristic is a variable one. Using filtered peptone water cultures in the same way, the author again demonstrated the absence of haemolysis in the true cholera strains and its marked presence in the El Tors.

The serological tests carried out were agglutination, Pfeiffer's phenomenon and complement fixation.

The agglutination results were as follows :—

Cholera serum agglutinates :—

V. cholerae	$\frac{1}{4000}$	+++	$\frac{1}{13000}$	++	
El Tor 3	$\frac{1}{1000}$	+++	$\frac{1}{2000}$	++	$\frac{1}{4000}$ +
El Tor 4	$\frac{1}{2000}$	+++	$\frac{1}{4000}$	++	$\frac{1}{10000}$ +

El Tor 3 serum agglutinates :—

V. cholerae	$\frac{1}{1600}$	+++	$\frac{1}{7000}$	++	$\frac{1}{9000}$ +
El Tor 3	$\frac{1}{4000}$	+++	$\frac{1}{11000}$	++	$\frac{1}{13000}$ +
El Tor 4	$\frac{1}{3000}$	+++	$\frac{1}{10000}$	++	$\frac{1}{12000}$ +

El Tor 4 serum agglutinates :—

V. cholerae	$\frac{1}{4000}$	+++	$\frac{1}{7000}$	++	$\frac{1}{8000}$ +
El Tor 3	$\frac{1}{2000}$	+++	$\frac{1}{8000}$	++	$\frac{1}{13000}$ +
El Tor 4	$\frac{1}{3000}$	+++	$\frac{1}{10000}$	++	$\frac{1}{13000}$ +

With Pfeiffer's test, each serum gives complete bacteriolysis with its homologous strain, but when crossed only incomplete bacteriolysis.

Complement fixation was made possible for the El Tor strains by heating the emulsions to 55° C. for half an hour and so getting rid of their haemotoxins.

Each vibrio was found to fix complement with its own serum even in small amounts, but *V. cholerae* did not do so with sera El Tor 3 and El Tor 4, nor did El Tor 3 and 4 as antigens fix complement in the presence of *V. cholerae* serum; on the other hand El Tor 3 could fix in the presence of El Tor 4 serum and *vice versa*, which would go to establish a group relationship between the two El Tor strains.

The author points out that as the four vibrios tested were those used in the preparation of the sera employed in the serological tests, too much stress cannot be laid on the specificity of the results obtained; it would be quite possible for instance that the cholera serum would not agglutinate a heterologous cholera strain to any greater extent than it did the El Tors.

Taken all in all the author considers that the differences between the orthodox *V. cholerae* and the El Tor strains are more quantitative than qualitative and must not be accepted as sufficient to place them in separate species.

H. S.

SCHOEBL (Otto). **Further Studies on Experimental Cholera Carriers.**—*Jl. Infect. Dis.* 1916. Aug. Vol. 19. No. 2. pp. 145-152.

A series of cholera inoculations into the gall bladder of guinea-pigs and of rabbits was instituted, with the view of establishing the condition that obtains in the artificially produced cholera carrier.

Inflammation of the gall bladder is a constant feature and in the case of rabbits of such intensity as to lead in most cases to the sealing of the gall duct. Unless this occlusion takes place cholera vibrios are to be found in the intestine for as long as they persist in the gall bladder, which in the guinea-pig was never less than 14 days.

An examination of the intestinal tract showed that cholera vibrios were almost the only bacteria to be found in the proximal part of the alimentary canal, competition with other organisms only commencing in the large intestine. In some cases the vibrios spread to the liver and appeared to have produced lesions there but, except where the animals had died shortly after inoculation, no septicæmic infection occurred.

H. S.

VON KUTSCHERA (Hans). **Zur Technik der Schutzimpfung gegen Typhus und Cholera im Felde.** [The Technique of Inoculations while on Active Service.]—*München Med. Woch.* 1916. June 20. Vol. 63. No. 25. pp. 917-918.

The author warns against the dangers of merely a short boiling of the hypodermic syringe, especially in mountain altitudes; he recommends a platinum needle which can be sterilised by flaming between each inoculation. So as not to incapacitate any of his men while actually in the firing line, he inoculated smaller quantities of vaccine, giving 0.3, 0.6, 0.9 and 1.2 cc. in place of the customary 1.0 and 2.0 cc.

H. S.

CHALMERS (Albert J.) & WATERFIELD (N. E.). **Paracholera caused by *Vibrio gindha* Pfeiffer 1896.**—*Jl. Trop. Med. & Hyg.* 1916. July 15. Vol. 19. No. 14. pp. 165-175. With 1 fig.

At Port Sudan on December 14th, 1915, a Sudanese was brought into hospital suffering from intense colic and diarrhoea which had had a sudden onset the previous night and had been associated with slight cramps and vomiting; the stools were of the severe diarrhoeal, not cholera, type; a non-cholera vibrio was isolated; the patient's serum did not agglutinate either it or the Koch comma bacillus; the collapse stage was soon passed; in four days the man was convalescent; on December 24th no vibrios were to be found in the stools and on December 26th he was discharged.

The authors decided that the case was one of paracholera, the organism isolated being the causative one and this because:—

"I. It was present in the faeces in enormous numbers when the man was ill.

"II. It was absent from the faeces tested culturally when the man was convalescent."

[No mention is made of any search for other organisms possibly the cause of the diarrhoea.]

They regard the vibrio as identical with *V. gindha* which was originally found in 1891 by PASQUALE in Erythrea not far from the Red Sea Province of the Anglo-Egyptian Sudan; they also suggest that DRENNAN's vibrio (1914), which she isolated from an Italian immigrant at New York, is the same or very closely allied and that therefore this type may be more widely distributed than is at present realised. The following comparison between *V. gindha* and the Port Sudan vibrio is given, the one point of difference between them—the atoxicity of the Port Sudan organism for guinea-pigs when given intraperitoneally—being accounted for by the suggestion that this vibrio is a less pathogenic form of the original *V. gindha*:—

No.	Character of reaction.	<i>Vibrio gindha</i> Pfeiffer, 1896.	Vibrio from Port Sudan.
1	Habitat	Water	Human intestine.
2	Length	Slightly shorter than the Cholera vibrio	Slightly shorter than the Cholera vibrio.
3	Polar flagellum	Single	Single.
4	Nitroso-Indol reaction.	Present at times	Present at times.
5	Pathogenicity Guinea-pigs subcutaneous injections.	<i>Nil</i>	<i>Nil</i> .
6	Intraperitoneal injections into guinea-pigs.	Toxic	Not toxic.
7	Intramuscular injections into pigeons.	<i>Nil</i>	<i>Nil</i> .
8	Cholera specific immunity reaction.	Negative	Negative.

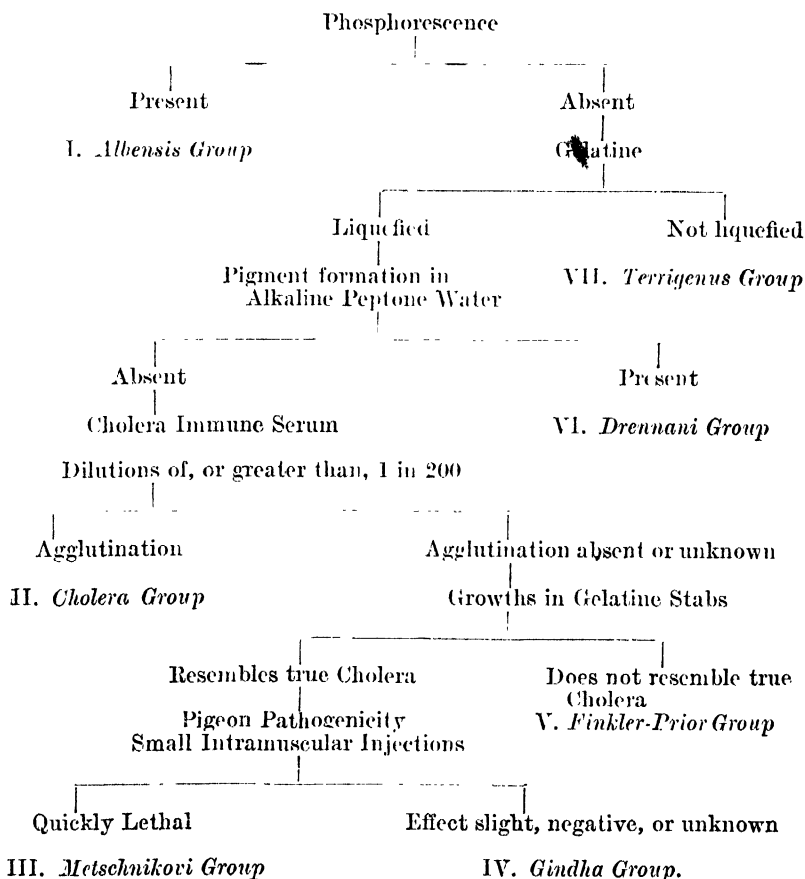
The authors accepting the division of the Spirillaceae into :—

- (1) the non-motile genus *Spirosoma*,
- (2) the motile genus *Vibrio*,
- (3) the genus *Spirillum*,

give the following table for the diagnosis of the various vibrios.

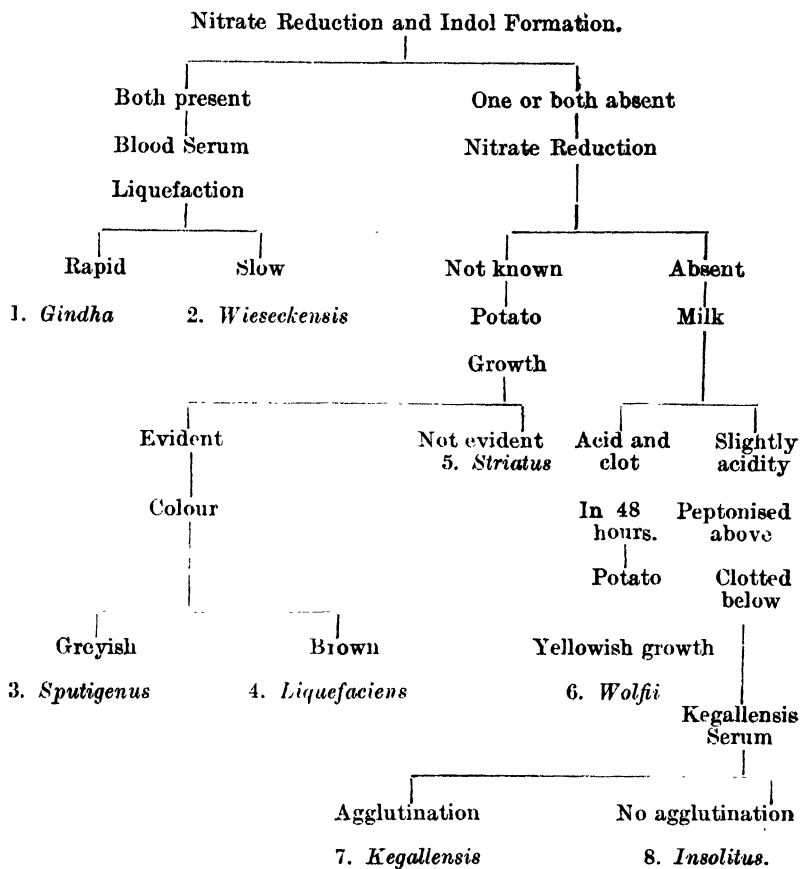
Diagnostic Table I.

The aërobic groups of the Genus *Vibrio* O. F. Müller emendavit Löffler.



Concentrating their attention on the Gindha group, they have attempted in the second table given here to accord a place, as representative of a sub-group, to each of a number of organisms which have been mentioned in the literature from time to time, and this notwithstanding the difficulties which very incomplete descriptions placed in their way.

Diagnostic Table III.

Gindha Group.

They strongly accentuate the necessity for fuller information about the various cholera-like vibrios isolated by different workers and in order to facilitate their grouping recommend the following routine :—

“ A. General Diagnostic Characters.

- “ 1. Does the vibrio grow aëroically, or is it an obligatory anaërobe ?
- “ 2. Is it phosphorescent ?
- “ 3. Does it liquefy gelatine ?
- “ 4. Does it produce pigment or gas ?
- “ 5. Does it agglutinate with specific cholera serum ?
- “ 6. How does it grow in gelatine stabs ?
- “ 7. What is the pigeon pathogenicity ?

“ B. Special Diagnostic Characters.

- “ 1. Morphology.
- “ 2. Biological characters.
- “ 3. Cultural characters on ordinary and special media, but especially including alkaline potato and inspissated blood serum.

" 4. *Biochemical and Chemical Reactions.*

- " 1. Sugars.
- " 2. Glucosides.
- " 3. Polysaccharides.
- " 4. Alcohols.
- " 5. Phenols.
- " 6. Milk.
- " 7. Voges-Proskauer.
- " 8. Nitrate reduction.
- " 9. Indol formation.
- " 10. Cholera red.
- " 11. Sulphuretted hydrogen formation.
- " 12. Haemolysis.
- " 13. Neutral red.

" 5. *Serological Reactions.*

" 1. Agglutination.

- " (a) Specific cholera serum.
- " (b) As many paracholera sera as possible.
- " (c) Its own specific serum.

" 2. Absorption test.

- " 3. Pfeiffer's reaction.
- " 4. Complement fixation.
- " 5. Action of normal human blood serum or normal rabbit blood serum.

" 6. *Pathogenicity.*

- " 1. Pigeons.
- " 2. Guinea-pigs.
- " 3. Rabbits.
- " 4. Attempts to infect animals by the alimentary canal in some way."

H. S.

MESSERSCHMIDT. **Das Vorkommen von mit Choleraserum paraggutini-
erenden Bakterien.** [The Occurrence of Para-agglutination with
Cholera Serum.]—*München. Med. Woch.* 1916. May 30. Vol. 63.
No. 22. pp. 810.

Isolating on Dieudonné's and on Aronson's media the author found, in the course of an examination of 1,000 stool specimens, some 20 non-cholera organisms (Coli, Proteus and Sarcina) which exhibited the phenomenon of paraggutination, that is to say, agglutinated with cholera serum *to titre limit*, controls put up with normal serum remaining unagglutinated.

Repeated subculture in one case carried out for four months, did not destroy this characteristic. These paraggutinating organisms were isolated from cases still carrying *V. cholerae*, from cases in which *V. cholerae* could not be found, from cholera convalescents and from healthy persons both inoculated and uninoculated.

H. S.

ŠIMÍČEK (Josef). **Pemphigoides Exanthem als Folgeerscheinung der
Choleraschutzimpfung.** [A Pemphigoid Eruption following
Cholera Inoculation.]—*Wien. Klin. Woch.* 1916. May 18. Vol. 29.
No. 20. pp. 622-623. With 2 text-figs.

An extensive pemphigoid eruption was noted by the author in a man after his second cholera inoculation, his first, as well as a previous

typhoid inoculation and a small-pox vaccination, having been undergone without any untoward symptoms.

On the evening after this second cholera inoculation, the patient had a rigor and complained of fever and headache. By the morning a vesicular eruption had appeared on the forehead and nose, later in the day spreading over the trunk. The inoculation site became red and tender.

The man's signs of nervous abnormality (tremors, nystagmus), which pointed to a probable beginning of disseminated sclerosis, might possibly have explained the eruption as being nervous in origin, but as the patient had received other inoculations previously without any disturbance the author is inclined to regard the condition as due to a hypersensitiveness following on the first cholera inoculation.

H. S.

HELMINTHIASIS.

KAKAMI. [*Paragonimus westermanii*, Investigation of the Lung Distoma in South Ham Kyung Province, Korea.]—*Chosen I Ho*. 1916. Feb. 1. No. 12. pp. 151-156. (Abstract based upon Review by R. G. MILLS, in *China Med. Jl.* 1916. July. Vol. 30. No. 4. pp. 292-294.

Lung distoma occurs in the province of Ham Kyung, Korea, in the middle reaches of three rivers which flow into the Japan Sea. The absence of infection in the villages along the coast is probably attributable to the tides, which affect these rivers for five or six miles inland and produce conditions adverse to the intermediate hosts. The infected district comprises about 800 miles of river valley; in the upper reaches, where the water is purer and colder, the disease is less common.

Of 471 persons examined 229 were found infected, i.e., 48.62 per cent. Of these 401 were males, of which 51 per cent. were infected, and 70 were females with a percentage of 33 infected.

The age incidence is tabulated :—

	Examined.	Infected.	Percentage.
Under 10	59	15	25
10-20	221	126	57
20-30	64	40	63
30-40	49	22	45
40-50	33	13	39
50-60	25	9	36
Over 60	20	4	20

In some villages the infection in men attains 82 per cent. Dogs in one district were said to be infected to the extent of 48 per cent. Cats are rarely kept in Korea and were not investigated. Pigs showed only 1 or 2 per cent.

Communities which took drinking water direct from the rivers were much more heavily infected than others. Those using well water escaped almost entirely. The distribution of *Melania libertina* corresponds to that of paragonimiasis in the district. The cercariae were contained in round sac-like bodies. These were at first taken to be sporocysts but Dr. MIYURI has decided that they were rediae. Attempts to transmit experimentally the infection through the snail were inconclusive. In addition to the Pond and Fur Crab the crayfish is suspected as another possible second host.

As a preventive measure, based on the assumption that *Melania libertina* was the essential intermediary, a sanitary commission has during the last two years collected and destroyed 210 millions of snails.

The author is inclined to doubt whether crab and crayfish are actively concerned, as the dogs never eat these animals while the Koreans always cook them first.

R. T. Leiper.

EXPLANATION OF PLATES.*

PLATE I. Fresh-Water Crab.

- Fig. 1. *Potamon obtusipes* (Stimpson) nov. sp., natural size.
- Fig. 2. *Eriocheir japonicus* De Haan nov. sp., natural size.
- Fig. 3. *Potamon dehaanii* (White), natural size.
- Fig. 4. Young encysted larva in the liver of a crab (*Potamon obtusipes*). $\times 20$.
- Fig. 5. Half-grown encysted larva in the liver of a crab. $\times 20$.
- Fig. 6. Full-grown encysted larva on the gill of a crab. $\times 20$.

PLATE II.

- Fig. 7. Encysted larvae of *Paragonimus westermanii* in the liver of a fresh-water crab (*Potamon obtusipes*).
- Fig. 8. Section through the lung of an experimentally infected puppy (No. 1) 60 days after feeding. A = passage of the worm. $\times 20$.

Illustrating "The Mode of Infection in Pulmonary Distomiasis."
NAKAGAWA (Koan). *Trop. Dis. Bull.* Vol. 8. No. 3. p. 179.

* Reproduced by permission from the *Journal of Infectious Diseases*.

PLATE I.



Illustrating "The Mode of Infection in Pulmonary Distomiasis."
NAKAGAWA (Koan). *Trop. Dis. Bull.* Vol. 8. No. 3. p. 179.

PLATE II.

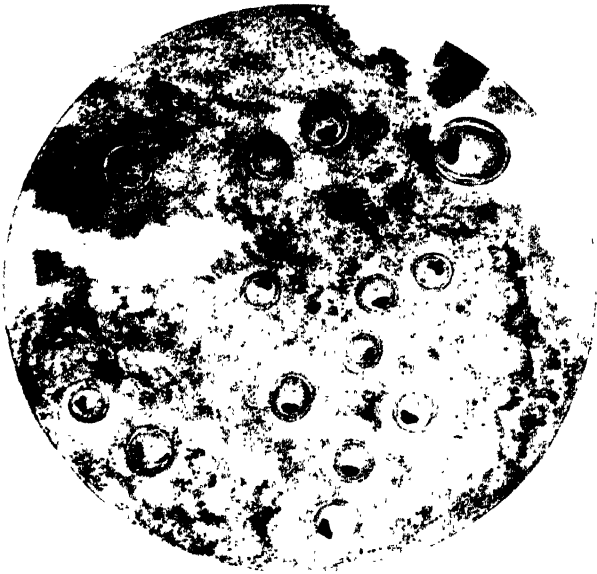


FIG. 7

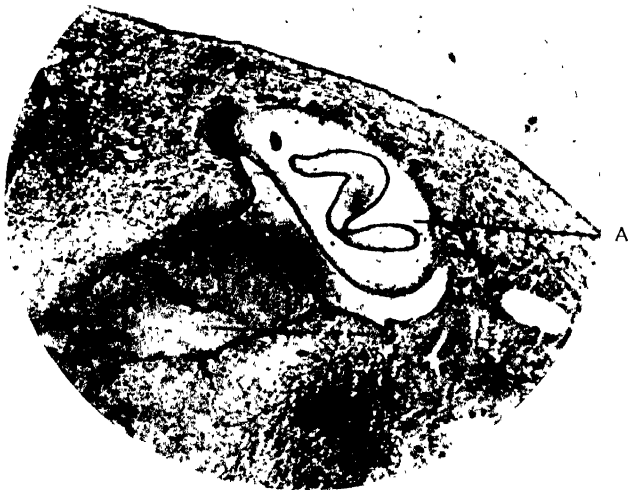


FIG. 8

Illustrating "The Mode of Infection in Pulmonary Distomiasis
NAKAGAWA (Koan). *Trop. Dis. Bull.* Vol. 8. No. 3. p. 179.

NAKAGAWA (K.). i. [Paragonimus, Development of the Supposed Last Stage in the Life History of, with an Account of the Young Worms.]—*Ju Zen Kai Shi*. 1916. Jan. Vol. 21. pp. 1-15.

ii. [Paragonimus. First Intermediate Host the Snail.]—*Ibid.* pp. 16-22. (Abstracts based upon Reviews by R. G. MILLS in *China Med. Jl.* 1916. July. Vol. 30. No. 4. pp. 285-287.)

A number of the chief points mentioned in Dr. Mill's abstract have already been given in this *Bulletin*, Vol 8, p. 179 in a review of a later paper by the same author.

The intermediate host has not been certainly demonstrated, but certain cercariae which appeared likely forms were found in *Melania libertina* and *Melania obliquegranulosa*. The author connects the former with *Clonorchis sinensis* and the latter must then be that of *Paragonimus*. A number of the snails supposed to be infected were enclosed with some crabs from a non-infected stream in a live box covered with fine gauze and submerged in a stream. In one case out of twenty encapsuled worms were afterwards found. The crabs used were *Potamon (Geothelphusa) obtusipes* [= *Thelphusa rubra*], *Potamon (Geothelphusa) dehaanii* [= *Thelphusa berardi*], and *Eriocheir japonicus* [= *E. formosa*].

The original article is reported to contain a detailed description of experiments upon seventeen dogs and cats fed on various amounts of parasite containing crab meat. The young parasites hatch in the ileum in 24-42 hours, penetrate the intestinal wall and reach the peritoneal cavity. They make their way towards the diaphragm in about 77 hours after their ingestion, penetrating it chiefly in the tendinous portion. Others penetrate the liver and ultimately reach the thoracic cavity. Very few of the worms actually reached the lung tissue. The infected animals died or were killed at intervals of from four hours to twenty-five days after feeding.

A series of measurements, based upon fixed specimens, indicate the rapidity of growth of the worms.

On release from the cysts the cercariae measure .3-.48 mm. in length by .18-.23 mm. in breadth. In twenty-one days these worms have attained a length of 1.3-2 mm. and a breadth of .8-1.1 mm. After ninety days they measure 6-7 mm. by 3.4 mm. The oral spine survived until the 25th day. After three weeks the ovary and uterus were visible and the testicles began to branch. After fifty days these organs were fully developed but the yolk glands were as yet rudimentary. After ninety days eggs were produced. It is stated that the details of structure and size of the parasite are given, as the worms described have not been definitely identified as *Paragonimus*.

R. T. L.

YOSHIDA (Sadao). Some Notes on the Encysted Larva of the Lung Distome.—*Jl. Parasit.* 1916. June. Vol. 2. No. 4. pp. 175-180. With 4 figs.

The encysted larvae of *Paragonimus* occur in the muscles, hypodermis, gills, liver and other organs of *Eriocheir japonicus* in Japan. In the muscles the cysts are most abundant in those of the base of each appendage. It is believed that the larval cysts have a tendency to

migrate towards the gills from all parts of the body by means of the blood circulation. They can also migrate slowly through the tissues. This migration may play an important part in the transmission of the infection to the final host. The author regards it as questionable, however, whether the cysts escape from the crab naturally and actively as has been reported by other observers. The cysts found in sediment in aquaria are discharged passively after injury and breaking up of parts, from accidental injuries during moulting, or on the death of the crab. The cysts have been found to remain alive naturally in water for a relatively long period—as a result of experiments for at least thirty days under natural conditions.

In certain districts *Sesarma dehaani* happens to be the only intermediate host present. As this crab is not taken as food it follows that the infection in these localities probably results from contamination of food and water by free discharged cysts.

R. T. L.

ODHNER (T.). **Die Verwandtschaftsbeziehungen der Trematodengattung *Paragonimus* Brn.** — *Zoologiska Bidrag Frua Uppsala*. 1914. Vol 3.

A comparative study of the little known fluke *Distomum acutum* found in the frontal sinuses of *Mustela putorius* with the *Distomum gastrophilum* from cysts in the pylorus of *Phocaena communis*, and *Collyrichum faba* from *Sylvia hortensis* has convinced the author that these three species make with the hitherto isolated genus *Paragonimus* four distinct genera in a natural family, named by him *Trogloremidae*. The following are the chief characters of this new family:—More or less flattened distomes or “Monostomes,” with rounded body 2-3 mm. long. The extreme posterior end is prolonged as a small appendage. Ventral aspect flat or somewhat hollowed, dorsal aspect vaulted. Skin armed with sharp spines. Musculature in those forms living in cysts is feebly developed. Gut with pharynx. Oesophagus not specially long. Gut branches end a more or less short distance in front of posterior end. Excretory vesicle Y-shaped or a single dilatation. Genital pore immediately before or behind the rim of the ventral sucker, in the middle line or slightly to the left. Cirrus usually absent. Pars prostatica and seminal vesicle always differentiated. Testes symmetrical, in or behind the middle of the body. Ovary immediately in front of testes on the right hand side and usually deeply indented. Yolk glands richly developed and also exclusively or chiefly extensive under the dorsal surface, leaving only a median streak unoccupied. Uterus long and much coiled or short and more kinked. In the former case the eggs are small, in the latter larger.

R. T. L.

MIYAIRI (K.) & SUZUKI (M.). **Der Zwischenwirt des *Schistosomum japonicum* Katsurada.** [The Intermediate Host of *S. japonicum*.] — *Mitt. a. d. med. Fak. d. k. Univ. Kyushu Fukuoku*. 1914. Vol. 1. pp. 187-197. With 2 plates.

Much has been written, but little is known regarding the carriers of the Schistosome worms. KATSURADA was inclined to adopt for the *Schistosomum japonicum* the theory offered by Looss to explain the

course of infection in *Schistosomum haematobium*, viz., a direct infection by the miracidium through the skin of man and a subsequent metamorphosis in the liver to form cercariae. TSUCHIYA however was firmly convinced that an intermediate host was essential and attempted to discover this. That he was on the right lines is shown by the discoveries of the authors, who were the first to succeed in tracing the development of this important parasite through its various stages in a fresh water snail to a free swimming cercaria and with this stage to infect a definitive host through the skin.

These researches have already been announced in various Japanese papers and were annotated in this *Bulletin* by KUMAGAWA in March, 1914 [Vol. 3. pp. 289-90]. The present paper however gives new and important details not previously available.

The intermediate host is a small dark grey coloured snail inhabiting a yellowish or brownish shell, with a right spiral and sharply conical. It is 6·7 to 9 mm. in height and 2·5 to 3·4 mm. in breadth. The coils number 8 to 8½ but in full-grown animals two or three are usually lost. The suture is deep and brownish. The operculum is horny and coils to the left. There are comb-shaped gills. The mouth cavity is furnished with a pair of jaws and a band-shaped radula of which the tooth formula is 3 + 1 + 3.

The snail belongs to the Hydrobiidae, but its further classification is left to those who specialise in this group.

Cattle manure was used throughout the experiments. The Schistosome eggs therein hatch after the dung has been mixed with rain-water. The miracidia swim about actively and, as has been described for *Fasciola hepatica*, they attack the molluscan intermediary when this is placed in infected water. After some minutes the tentacles, head, neck and mantle are bespeckled with embryos. Eventually these penetrate into the tissues and especially those of the base of the mouth cavity, around the brain and foot ganglia, and in the gills. The ciliated covering is eventually lost, but the flame cells in the excretory system survive. The miracidium now becomes a sporocyst which continually increases in size. (Groups of small cells begin to form rudimentary cell balls, which become later Rediae. Over 50 Rediae may result from a single sporocyst.

The Redia may be greatly elongated or again egg shaped. It is stippled with fine points at the anterior end. The mouth is frequently widely open. There is little to be seen of the alimentary canal. The body cavity is filled with large cell and small cell balls. The Rediae crowd the liver. These extraordinarily long and much coiled Rediae tubes contain cell masses which become elliptical with a terminal knob, which is the rudiment of a tail. In these masses oral apparatus and ventral sucker are in process of formation. These eventuate in Cercariae which attain maturity after at least seven weeks.

The Cercaria has a stout tail which is split into two arms at its distal third. Body and tail are covered with fine spines. The oral apparatus is larger than the ventral sucker. In the body cavity are three pairs of large single round glands. From these long ducts lead to the rim of the mouth. Their orifices are indicated by four spines. Concerning the alimentary canal it is noted only that at the bottom of the oral apparatus there is a somewhat spacious blindsack. In the excretory system are five pairs of flame cells. Apparently cercariae

which have attained their development but have not left the host in autumn can remain until the following spring. Young Rediae are not found during the winter. The intermediate host was first implicated in August.

Infection experiments were made upon mice. Out of one hundred shells usually three or four snails are naturally infected. It was found that when not more than three mice were left in a large dish for from half to two hours with water containing at least one hundred snails these mice became infected. Mice were then submitted to infection with cercariae derived from dissection. These were also successfully infected but with much greater difficulty. Lastly infected snails were opened and left in a drop of water on a part of the skin of a mouse. The resulting infection was so severe that the mouse could not survive three weeks.

The paper is illustrated with two fine plates showing the intermediate host and the eggs, the miracidia and the various stages found in the snails. [The work appears to have been carried out during 1913. It is stated that the manuscript was completed on 25th January 1914, but there is no indication as to the date upon which the journal itself was published. It is exceedingly regrettable that this and other researches of the first importance that have been carried out by Japanese investigators should be issued in such inaccessible form.]

R. T. L.

TEODORO (G.). *Studi recenti sulla Bilharziosi umana.*—*Pathologica*. 1916. Sept. 15. Vol. 8. No. 188. pp. 285-287.

Although listed as an original communication this publication is in reality a review of three recent papers on the mode of spread and the specific nature of the parasites causing vesical and intestinal lesions. The recent paper by LEIPER on the relation of the terminal spined and lateral spined eggs of Bilharzia is quoted at length [for this see *Bulletin*, Vol. 7, p. 347]. The author also refers to two communications in the *Verhandlungen der Japanischen Pathologischen Gesellschaft* for 1914 [Vols. 48 and 51] relating to the development of *Sch. japonicum*; one from KATSURADA [Vol. 51] and the other from OGATA [Vol. 48]. Teodoro states:—

“In these the authors mention the statements of two Japanese, MIYAIRI and SUDZUKI, as having found the cercariae of *Sch. japonicum*, and OGATA in addition gives a short description of it, and a diagrammatic illustration. This cercaria has its tail bifurcated at the apex, like the cercariae of other trematodes, and the mouth is furnished with eight hooks; the acetabulum is situated close to the tail. The penetration of the cercaria through the skin has been demonstrated experimentally with animals. KATSURADA confirms the assertion of MIYAIRI and SUDZUKI, but regards the question of the intermediate host of *Sch. japonicum* as not altogether cleared up.

“For this reason, the two notes above-mentioned, being short and even dogmatic [*apodittiche*] in form, without any indication of the *modus operandi* or of the animals experimented on, oblige the judicious reader to wait for more precise data, before accepting the assertion that the cercariae penetrate the skin.”

[These two Japanese papers have not yet reached this country, nor have they appeared hitherto as titles in lists of references available at the Bureau.]

J. B. N.
R. T. L.

KOIKI (G.). [Investigation of Patients Infected by *Schistosomum japonicum*.] *Saikin Gaku Zasshi*. 1916. Apr. 1. No. 246. pp. 523-530. (Abstract based upon Review by R. G. MILLS in *China Med. Jl.* 1916. Sept. Vol. 30. No. 5. p. 380).

In the villages around Shushin adjoining the east coast of Japan the author examined 1,077 persons. Of these 42 were found infected with *Schistosomum japonicum*. All but three of the cases were farmers. Only 22 realised that they were not in good health. Ten had enlarged livers and twelve felt tenderness on pressure. It is said that "most of the patients remembered having had an itchy eruption on the legs about a year previous, but recalled no constitutional symptoms."

R. T. L.

LEIPER (R. T.). 1. Report on the Results of the Bilharzia Mission in Egypt, 1915. Part IV.—**Egyptian Mollusca**. Based largely upon a typical set partly collected and arranged by J. Gordon THOMSON.—*Jl. Roy. Army Med. Corps*. 1916. Aug. Vol. 27. No. 2. pp. 171-190. With 30 figs.

ii. Observations on the Mode of Spread and Prevention of Vesical and Intestinal Bilharziosis in Egypt, with Additions to August, 1916.—*Proc. Roy. Soc. Med.* 1916. July. Vol. 9. No. 9. (Occasional Lectures.) pp. 145-172. With 25 text figs.

i. The previous reports were summarised in this *Bulletin*. Vol. 6. p. 437, and Vol. 7. p. 345. The present instalment consists of a list of Egyptian molluscs, with figures, and an addendum on army prophylaxis. Dr. Leiper writes:—

"The larval metamorphosis of all digenetic trematodes occurs without known exception in the bodies of molluscs belonging to the classes Gastropoda and Lamellibranchia. . . .

"The large majority of trematode larvae develop in the Gastropoda. The Gastropoda are specially characterized by a univalve shell, an asymmetrical organization and a well developed head, while the Lamellibranchia have a bivalve shell, an internal and external symmetry and a rudimentary cephalic region."

A classification table is given of these two classes, followed by the names and locales of the Egyptian species with figures from two or three aspects: in every case, it is stated, the diagnosis is provisional. The species of present importance are *Planorbis boissyi*, *Bullinus contortus*, *B. dybowski* and *B. innesi*. *P. boissyi* appears to have a limited distribution in Lower Egypt but a wide distribution in the Sudan. It has been recorded on several points of the White Nile from Abba Island to the Bahr-el-Zaraf. It is the intermediate host of *Bilharzia mansoni* in man in Egypt [see figure, this *Bulletin*, Vol. 7. p. 346]. *B. contortus* [fig. *loc. cit.*] is found in the irrigation canals, usually associated with *B. dybowski*. It has been reported from "North, West and South Africa, Abyssinia, the Euphrates, and South Europe." It and *B. dybowski* are intermediate hosts of *Bilharzia haematobium* (*sens. strict.*) in man in Egypt. *Bullinus innesi* on some occasions was found infected with cercariae of *Bilharzia haematobium* (*sens. strict.*). Not much seems to be known of the distribution of this mollusc. A table is given of "Egyptian molluscs in which trematode larvae occur."

In the spring of 1916 "further experiments were made . . . to determine the degree of protection afforded by a modified Jewell system of filtration, which it was proposed to instal at various points on the Sweet-Water Canal." In this system alum is added in a settling tank, prior to filtration through sand about a metre in depth. This provides six possible traps for the *Bilharzia* cercariae. It was found that the cercariae eluded all the traps and were active after traversing thirty inches of sand. The efficacy of such mechanical systems, therefore, depends solely on the delay interposed "between the discharging mollusc and the consumer." Chemical sterilisation, as stated in a previous summary, is effected either by two 1 gm. "tabloids" acid sodium sulphate dissolved in a quart of water or two parts of available chlorine in a million. Boiling is of course also effective. It is found further that ablution water is easily rendered quite safe by the addition of "ordinary Army Cresol" 1 in 10,000.

Full acknowledgment is made of the assistance for varying periods of Drs. COCKIN and J. Gordon THOMSON and of Mr. W. McDONALD.

ii. This publication, based on a lecture given in July 1915, forms a summary of the author's work in Egypt, which has been set out in detail in previous papers, one of which is summarised above and the rest in previous numbers of the *Bulletin*. Several illustrations are reproduced.

A. G. B.

CAWSTON (F. G.). **Report on the Examination of 1,000 Molluscs in Natal.**—*Med. Jl. S. Africa*. 1916. June. Vol. 11. No. 11. p. 197.

An examination of 1,000 different specimens of molluscs found in stagnant pools and in the slow running streams of Natal was made during April, May and June. These were diagnosed by Mr. BURNUP of Maritzburg as follows:—

<i>Isidora forskali</i>	..	..	..	3
<i>Isidora tropica</i>..	..	..	..	50
<i>Physopsis africana</i>	..	..	..	522
<i>Ancylinae</i>	..	..	..	20
<i>Planorbis leucheilus</i>	..	..	..	a few
<i>Planorbis pfeifferi</i>	..	..	..	228
<i>Limnaea natalensis</i>	..	..	..	184

"Tadpole" cercariae or cercariae possessing an undivided tail occurred in 29.1 per cent. of *Planorbis pfeifferi*. "There were several varieties of these cercariae present." "Bilharzia forms of cercariae" were present only in *Physopsis africana* in 17.4 per cent. The author now finds that there are several forms of cercariae [in *Physopsis africana*] in Natal which answer to the description of the *Bilharzia* group in Egypt and the Far East. One had eye spots, one had very long prongs to the tail and occurs apparently only in the Umsinduzi River, a third is present in 15 per cent. of the *Physopsis africana* found in the Durban brickfields. All experiments upon animals have so far proved negative.

[The use of the term "Bilharzia forms" for cercariae with bifid tails is exceedingly misleading. The presence of a bifid tail is no indication that a cercaria belongs to any special systematic group. In Egypt 9 out of 27 recorded species of cercaria have "bifid tails."]

R. T. L.

CAWSTON (F. G.). **The Cercariae of Natal.**—*Jl. Trop. Med. & Hyg.* 1916. Sept. 1. Vol. 19. No. 17. p. 201.

So far sporocysts containing cercariae with bifid tails have been found in South Africa in *Physopsis africana* only. The liver of this snail when infected is yellowish; when the "sporocysts" contain tadpole forms the liver is more often orange coloured. "The cercariae met with at the coast are larger than those found at inland towns; most show an absence of pharynx but occasionally one comes across a sporocyst containing cercariae with bifid tails and a muscular pharynx." The author finds that "until the cercariae are fully developed it is impossible to differentiate the distinctly human form from the other common forms of cercariae with bifid tails." It would seem that human cercariae are present in about five per cent. of the specimens of *P. africana* found in the freshwater bathing places.

The author tabulates his results for April and May as follows:—

		Healthy.	With "tadpole" forms.	With bifid tails.
April ..	<i>P. africana</i>	159	13	30 (5 distinctly human forms).
	<i>Limnaea natalensis</i>	87	2	—
	<i>Planorbis Pfeifferi</i>	17	7	—
May 1-15	<i>Physopsis</i>	174	7	34 (11 distinctly human forms).
	<i>Limnaea</i>	54	3	—
	<i>Planorbis</i>	110	53	—

[It is difficult to make out to what extent these figures are included in those quoted in the preceding note. The text is illustrated with seven figures of cercariae, and one figure with two "suckers" is described as a "sporocyst showing escaping cercariae."]

R. T. L.

BUTLER (G. G.). **Some Observations made on apparently Healthy Boys at the Bo School for the Sons of Chiefs.**—*Sierra Leone Ann. Rep. on the Med. Dept. for Year ended 31st Dec., 1915.* pp. 26-29.

Seventy-five scholars of the Bo School were examined in November and December 1915. In 20 out of 75 cases Bilharzia eggs were found microscopically in the urine. The majority of the infections occurred in boys of the tribes Kissy, Mendi and Konnoh. No cases at all occurred among the Timnee boys and from enquiry it appears that while the Konnoh district is a country of many permanent streams, the Timnee district is almost completely dried up during the dry season.

The Kennema district is infected with Bilharzia and the streams surrounding this town are swarming with snails, which to the author appear to be similar to the snail that has been recognised as the intermediary host for the human Bilharzia of Egypt. In some cases of Bilharzia infection there was no sign of cystitis although living ova were found in the urine, and its presence seemed to give no trouble

whatever to the host. The Mendi name "Kanye" is used to describe equally gonorrhoea and urinary bilharziasis, but a white variety or gonorrhoea proper is distinguished from a red variety which is actually the result of urinary Bilharzia. Hitherto Bilharzia infections have always been regarded as rare in Sierra Leone.

R. T. L.

ATKINSON (E. L.) **An Expedition to the Far East to investigate the Spread of Trematode Diseases, with Special Reference to *Schistosoma japonicum*, and with a Note on Some Protozoa as Causes of Dysentery.**—*Jl. Roy. Nav. Med. Serv.* 1916. Oct. Vol. 2. No. 4. pp. 485-490.

This report gives a brief account of the itinerary followed on the occasion of a visit to the Far East with the Wandsworth Scholar of the London School of Tropical Medicine in 1914. The helminthological results are briefly summarised from the Report of the Advisory Committee Tropical Diseases Research Fund, already annotated in this *Bulletin* [Vol. 6, p. 295].

R. T. L.

JOYEUX (Ch.). **Sur le cycle évolutif de quelques Cestodes. Note préliminaire.**—*Bull. Soc. Path. Exot.* 1916. Oct. Vol. 9. No. 8. pp. 578-583.

In this contribution the author confines himself to the biological results of experimental studies on the transmission of *Dipylidium caninum*, *Hymenolepis diminuta* and *Hymenolepis nana*. The morphological details will appear in a separate memoir.

As is well known *Dipylidium caninum* has, as intermediate hosts, *Trichodectes canis*, *Ctenocephalus canis* and *Pulex irritans*. From an examination of sections of the proboscis the author concludes that the eggs of the tapeworm cannot be sucked up by these fleas. The flea larvae however readily swallow the eggs. In the intestine these eggs hatch and the embryo tapeworms quickly migrate into the general body cavity of the flea larva where they remain until the insect metamorphosis is complete.

The researches of GRASSI and ROVELLI implicating *Asopia farinalis* and *Anisotabis annulipes* in the spread of *Hymenolepis diminuta* are fully confirmed. Attempts to infect *Forficula auricularia*, *Periplaneta orientalis* and *Blatta germanica* were unsuccessful. *Blaps mortisaga* similarly proved immune. *Tenebrio molitor* was readily infected but in the adult stage only. Success attended experimental infections of *Ceratophyllus fasciatus*, *Xenopsylla cheopis*, *Pulex irritans* and *Ctenocephalus canis*, but with larvae only.

Rats were readily infected by feeding with infected specimens of these various insects.

Hymenolepis nana is a frequent parasite of man, especially in childhood; its identity with *Hymenolepis murina* in the rat is still uncertain. The author considers that the differential characters described by von SIEBOLD and others are much exaggerated. The transmission of the rat tapeworm is direct, as recorded by GRASSI. The experiments were easily repeated. Infection followed the ingestion of eggs in a large series of rats and mice. The cysticercoid developed

in the intestinal villi as observed by the Italian investigator ; MINCHIN and NICOLL and, later, JOHNSTON have stated that they have found the cysticeroid of this species in the body cavity of *Xenopsylla cheopis* and *Ceratophyllus fasciatus* but the author has repeatedly failed to induce infection experimentally in these and other fleas.

It was hoped that experimental infection of rats with eggs from cases of *Hymenolepis nana* in man might afford material for a detailed comparison of this species with *Hymenolepis murina*, but experimental difficulties which supervened have not yet been wholly overcome.

R. T. L.

BLANCHARD (R.). *Tête de Davainea madagascariensis*.—*Bull. Soc. Path. Exot.* 1916. July. Vol. 9. No. 7. p. 413.

In a brief notice accompanying the presentation to the Society of Tropical Pathology in Paris of drawings of five specimens M. Blanchard gives some new facts regarding this rare parasite of man. Not only is the rostellum armed but the suckers also are provided with hooks. These number about 110 and are arranged on at least five concentric rows.

R. T. L.

LANE (Clayton). *Hymenolepis nana*. [Correspondence.]—*Indian Med. Gaz.* 1916. Aug. Vol. 51. No. 8. p. 314.

With reference to the note on *Hymenolepis nana* in the *Indian Medical Gazette* for June [this *Bulletin*, Vol. 8, p. 192], Major Clayton Lane writes pointing out there are on record earlier cases of the occurrence of this parasite in India than that cited, viz., by LANE in *Indian Medical Gazette* for 1904 and 1909, by JONES in 1910, while Col. BANATVALA had reported also the eggs in a patient in the Nagpur Lunatic Asylum.

R. T. L.

BETTENCOURT (A.). *Casos de infestação pela Hymenolepis nana em Portugal*. [Cases of Infection by *Hymenolepis nana* in Portugal.]—*Med. Contemporanea*. 1916. June 18. Vol. 34. No. 25. p. 193.

Referring to a recent communication by MACHADO on the occurrence of *Hymenolepis nana* in Portugal, the author recalls that he recorded a case in a communication to the Portuguese Society of Natural Sciences on March 17th, 1915. Details are also given from a forthcoming paper by Senhora D. Isaura PAIO, which show that, out of 503 cases of children examined for the purpose, 33 revealed the presence of ova of *H. nana*, either alone or associated with the eggs of nematodes. From this it would appear that *H. nana* is the commonest Cestode in Portugal, as it is in Italy and Sicily, where GRASSI found it in 10 per cent. of children belonging to the poorer classes.

J. B. N.

ANCONA (Arrigo). **Per un nuovo caso di elmintiasi da *Dipylidium Caninum* nell'uomo.** [A Case of Infection by *Dipylidium caninum* in the Human Being.]—*Riforma Med.* 1916. June 12. Vol. 32. No. 24. pp. 652-655.

A case of infection by the common dog tapeworm in a female child aged five years. Itching of the anus was observed, and the child was found to be passing proglottides of a tapeworm which was recognized as belonging to the species mentioned. A vermifuge of 2½ grammes of ethereal extract of male fern, and one gramme of Kamala, was given, which procured the expulsion of fragments of tapeworm measuring in in all 50 centimetres, so that there were probably several worms present. A cat with which the child had been in the habit of playing was found to be infected with the same tapeworm.

The author remarks that there are now on record 72 cases of this infection in man; the greatest number being reported from Denmark and Germany. A bibliography of recent memoirs on the subject is appended.

J. B. N.

MENDOZA-GUAZON (Maria Paz). **A Case of Infestation with *Dipylidium caninum*.**—*Philippine Jl. Sci.* Sect. B. Trop. Med. 1916. Jan. Vol 11. No. 1. pp. 19-31. With 3 text figs.

Four chains of melon-seed-like tapeworm segments were obtained post-mortem from the upper part of the ileum of a male child eight months old. A very full account of the autopsy is given. No eggs were found in the faeces. There is no previous record of the occurrence of *D. caninum* in the Philippines, but BOWMAN (1910) suspected that the Igorots in Benguet subprovince might be infested with this parasite owing to the fact that dog meat is one of their constant foods. Although these dogs are infected with *D. caninum* and the fleas *Pulex serraticeps* and *P. irritans* occur in that region, he did not find eggs of *D. caninum* in 100 stool examinations.

In one of the parasites only was a head and neck found—this was buried in the mucosa. In this strobila, which measured 48 mm. long and had about 40 segments, the head was small and rhomboid and showed a retracted rostellum with four rows of alternating rose-thornlike hooklets. The largest segment was 3 mm. long by 1 mm. in breadth after staining. The strobila, head and posterior segments are carefully delineated.

The absence of the parasite in man in the Philippines is attributed to:—

- (1) Filipino children are not fond of playing with dogs and cats;
- (2) Puppies are fed on soft boiled rice, not milk, and in a separate bowl;
- (3) Babies are almost always breast-fed;
- (4) Babies are left in hammocks, not on the floor, and are thus little in contact with dogs and cats;
- (5) Although some tribes eat dog meat they burn off the hair before removing the skin.

R. T. L.

da MATTA (Alfredo A.). **Os nematoides do tubo digestivo de que modo infestam o organismo ? Prophylaxia.** [By what Channels do the Nematoids of the Alimentary Canal enter the System? Prophylaxis.]—*Brazil Medico.* 1916. Apr. 15. Vol. 30. No. 16. pp. 121-124.

An occasional article recounting the various ways in which the alimentary canal of the human being in the tropics can become infected with nematoid worms; bare feet, flies, primitive sanitary arrangements, and the custom of manuring gardens and fields with human dejecta being the principal. The usual methods of prevention as given in recent text books are tabulated at the end.

J. B. N.

RANSOM (B. H.). **The Occurrence in the United States of Certain Nematodes of Ruminants transmissible to Man.**—*New Orleans Med. & Surg. Jl.* 1916. Oct. Vol. 69. No. 4. pp. 294-298.

The author draws attention to the common occurrence in the United States of twelve species of *Trichostrongylus*. Three of these, viz., *T. vitrinus*, *T. probolurus* and *T. colubriformis* (= *T. subtilis*) have been found in man as occasional parasites in other parts of the world.

The absence of records of these forms as parasites in man in the United States is probably due to the fact that in man as a rule they occur in small numbers only and are very slender and difficult to detect. Their eggs are of large size but somewhat similar to the eggs of ankylostomes. As JIMBO (1914) found *Trichostrongylus orientalis* in Japan in 27 out of 57 post-mortems and had in addition five patients who were infested with this parasite one is lead to suspect that the trichostrongyles are not such rare parasites in man as is generally supposed.

Haemonchus contortus is another very common parasite of ruminants whose presence may be anticipated in man on the strength of the report of a case in Brazil by MAGALHAES in 1908.

[It is strange that these various parasites have not been reported by the United States Hookworm Commissions.]

R. T. L.

STEWART (F. H.). i. **Further Experiments on Ascaris Infection.**—*Brit. Med. Jl.* 1916. Oct. 7. pp. 486-488.

ii. **The Life-History of *Ascaris lumbricoides*.** [Correspondence.]—*Ibid.* Sept. 30. p. 474.

i. In the *British Medical Journal* for July 1st, 1916, the author showed [see this *Bulletin*, Vol. 8, p. 197] that when mature *Ascaris* eggs were fed to mice larvae were found in the lungs and liver. A further series of twelve experiments is now reported. In these the larvae of *Ascaris lumbricoides* and *A. suilla* were found to appear in the bronchi, trachea and mouth of the mouse and rat on the night of the seventh day and during the eighth day after infection. None appear in the respiratory tract later than this. These larvae cannot live in tap water but can survive for twenty-four hours on damp bread and for forty-eight hours in rat's lung. The author is of opinion that these experiments strongly suggest that man is infected by contaminated food and he believes "they [larvae] will be found to emigrate actively in the saliva on to the food which is being nibbled by the rodent."

To four mice were given eggs of *Ascaris marginata* and in three, larvae were found in the liver.

The *Ascaris* larvae found in the lung were but a small percentage of those administered in eggs. From the average dose of 5,000 eggs certainly not more than 50 larvae, i.e., 1 per cent. were recovered from the lungs.

The larvae bore into the venules of the portal system or ascend the bile duct. They occur in the dilated capillaries of the liver between the second and fifth day but as they have a diameter three times that of a red blood corpuscle they cannot pass through a normal capillary. The liver cells around the larvae undergo rapid degeneration and the larvae are thus able to work their way into the hepatic venules, and thence by the vena cava to the lungs. Here embolism of the arterioles occurs and the larvae pass with the effused blood into the air vesicles.

Attempts were made to infect five pigs by feeding them with *Ascaris* larvae in the lungs of mice. Two of the experiments proved negative; in one there was a single female *Ascaris*, in another two females and four males, while in the third three males and twelve female *Ascaris* were found. These experiments, it is said, "tend to prove that the larvae from the lungs of rodents can infect the pig and it is probable that in nature infection of man and the pig takes place by food contaminated by rats or mice."

Ripe eggs of *Ascaris marginata* and *Ascaris mystax* were also administered to a pig with negative results.

ii. Captain Stewart writes to say that an editorial in the *British Medical Journal* dealing with his researches on *Ascaris* development makes no reference to his theory "that the rat and mouse are intermediate hosts in the life history of *Ascaris lumbricoides*," but that another theory is advanced. He is of opinion that sufficient weight has not been given to his recorded experiments on pigs. The theory that the *Ascaris* passes through the lungs of the same host as that in which it attains full maturity he rejects as untenable.

R. T. L.

LANE (Clayton). **The Genus *Ancylostoma* in India and Ceylon.**—*Indian Jl. Med. Res.* 1916. July. Vol. 4. No. 1. p. 74.

The author brings together in this paper a very useful series of descriptions and illustrations of the members of the genus *Ancylostoma* hitherto found in India. Two of these, *A. duodenale* and *A. ceylanicum*, occur in man. *A. ceylanicum* and *A. caninum* are common in dogs, while *A. malayanum* has been found only in the Malay bear. Certain emendations in the accepted descriptions of the last named parasite are justified on the basis of the new researches recorded.

In the discussion on *Ancylostoma ceylanicum* it is recalled that this parasite was first named and described from a Ceylon civet by Looss in 1911 and was first observed by the author as an occasional parasite of man in 1913. It has since been recorded from Siam. Dr. DARLING writes from Kuala Lumpur that he also has found this species twice, once in a Tamil and once in a Chinese and that the dogs "are full of them." On the controversy regarding the identity or otherwise of this ankylostome with *A. braziliense*, Lane says "although the description by Looss of the character of the bursal rays probably definitely settles

the non-identity . . . it does not, any more than does the description of de FARIA, give any real help in settling whether a fine rayed *Ancylostoma* subsequently found by some other observer is *A. braziliense* or some allied species; nor does it enable its natural affinities within the genus to be fixed."

In regard to the oral capsule it is observed that with the three-toothed type of mouth armature there is associated a different type of arrangement of the bursal rays from that found with the two-toothed type. This is used to subdivide the genus into two subgenera (a) *Ancylostoma* (*Ancylostoma*) *duodenale* type and *A. (A.) caninum*, (b) *Ancylostoma* (*Ceylancylostoma*) *ceylanicum* type and *A. (C.) malayanum*.

R. T. L.

TISSEN (J.). **Oleum chenopodium en ankylostomiasis.** [Oil of Chenopodium in Ankylostomiasis.]--*Geneesk. Tijdschr. v. Nederl. Indië*. 1915. Vol. 55. No. 4. pp. 450-457.

A paper confirming VERVOORT's experience with regard to *Oleum chenopodii* as a vermifuge [see this *Bulletin*, Vol. 3, p. 297]. The author finds it quite as good as thymol, when given in three successive doses of 16 drops for each dose. This, however, will not in any case procure the expulsion of more than 60 per cent. of the worms present, the remainder necessitating a second treatment. For VERVOORT's method of evaluating the precise value of a vermifuge in terms of the percentage of worms which it expels, see his original paper, as above.

J. B. N.

RANSOM (B. H.). **Effects of Refrigeration upon Larvae of *Trichinella spiralis*.** *Jl. Agric. Res.* 1916. Jan. 31. Vol. 5. No. 18. pp. 819-854.

In an earlier article in 1914 it had been shown that contrary to generally accepted views low temperatures have a very pronounced effect upon the vitality of trichina in infected pork. These results have been confirmed and extended.

Four hundred pounds of trichinous meat were frozen and kept below the freezing point of water for varying periods from a few minutes to fifty-seven days. On removal from the freezer the meat was allowed generally to thaw slowly at ordinary room temperature. A portion was chopped or ground into fine pieces, placed in an artificial gastric juice and incubated at 38° to 40° C. overnight and then washed and sedimented. The trichinae were found isolated from their capsules in the sediment and were studied as regards activity, etc., on a warm stage.

After exposure to a temperature of about 15° F. for 23 days trichinous meat has proved to be infective, but this temperature is injurious to the worms and such meat frequently fails to give a positive result in test animals. A temperature of 10° F. is more injurious but again the effects are uncertain. After 14 days of exposure the degree of infection is, at best, slight and is *nil* after 20 days.

Apparently 10° F. is "a critical point below which the effects of cold become suddenly much more pronounced." At 5° F. only a very small proportion survive more than five days and the risk of infection is very slight.

Below 5° F. protoplasmic changes are evident.

Rapidity of freezing and thawing produces no appreciable effect.

The author concludes that trichinous meat should be refrigerated at a temperature not higher than 5° F. and for not less than 20 days.

R. T. L.

THÉZÉ (J.). *Pathologie de la Guyane française. (Lèpre, Filariose, etc.). Rapport sur les Travaux de l'Institut d'Hygiène et de Bactériologie 1914-1915.*—*Bull. Soc. Path. Exot.* 1916. July. Vol. 9. No. 7. pp. 449-469.

Like leprosy, elephantiasis is very widespread in French Guiana. One sees all the various manifestations of filariasis such as chyluria, hydrocele, chylous ascites, lymphscrotum and lymphadenoma. Even Europeans are not exempt.

Out of 133 patients in hospital 37 showed *Microfilaria nocturna* in the blood at night. The blood was taken once only and twenty-four of the patients were suffering from advanced elephantiasis, so that the incidence of filarial infection is probably higher than 28 per cent. The *Microfilaria demarqui* was met with three times.

In a woman of about 50 years of age, suffering from slight lymphadenoma, an abundance of clear lymph discharged periodically from two small non-ulcerating tumours situated in the right groin. Floating in this fluid were small flakes of albuminous appearance. Under the microscope these proved to be masses of microfilariae. Similar filariae were found in the husband and daughter of the patient. When seen fresh the microfilaria progressed easily. It measured from 280 μ to 305 μ long and had a breadth of only 7 μ . There was no sheath, the caudal extremity was very slender. The embryo never appeared in the blood.

After staining with Giemsa the length was only 270-290 μ . The "spots" appeared (1) at the cephalic extremity, (2) at 24.1 per cent. of the total length, (3) extending from 30.4 per cent. to 35.6 per cent. of the total length, (4) at 58.29 per cent., and (5) inconstant at 79.1 per cent. of body length. All the characters of this embryo, like the lesions associated with it, bring it into nearer relation with *Microfilaria volvulus* than with other known forms in man.

R. T. L.

LAVERAN (A.). *Sur un cas de filariose due à F. loa d'une durée de 14 années.*—*Bull. Soc. Path. Exot.* 1916. July. Vol. 9. No. 7. pp. 436-438.

The patient upon whom these notes are based visited Ogowé in the French Congo in 1899, where he remained for some months. In the same year he was invalided home with dysentery but returned in 1900 and spent eight months in the Forest. He was again invalided and remained in France for eighteen months. In March 1901 a Filaria was noticed in the eye for the first time. Next year a surgeon unsuccessfully attempted to extract a worm from the left eye. The blood was examined at this time but no microfilariae were found.

Between 1903 and 1906 the patient visited Senegal twice. The worm presented itself in one or other eye at intervals of not less than two months and mostly during the night.

In 1907 a voyage was made to the Sudan. After eight months the patient returned to France. Between 1907 and 1909 the worms appeared under the conjunctiva at least twice. In 1909 a female worm about 6 cm. in length was extirpated and another adult was removed in Senegal in the following year. A third worm was excised during the winter of 1912 at Algiers. Microfilariae were noticed more or less commonly in the blood at various times from 1911 to 1913. In December 1914 a small male was seen to be followed by a female and the patient writes that the filaria worms for some years past have shown themselves in pairs, the male following the female at a few moments interval. Since 1914 neither adults nor embryos have been detected.

R. T. L.

FAMULARI (Sebastiano). Il primo esempio autoctono di Filariosi in Sicilia. [The First Indigenous Case of Filariasis in Sicily.]—*Malaria e Malat. d. Paesi Caldi*. 1916. May-June. Vol. 7. No. 3. pp. 141-145. With 1 coloured plate.

Notes of a case of filariasis in a woman, 52 years of age, who had never been out of Sicily, and had spent the greater part of her married life in Messina. When that town was devastated by an earthquake a few years ago, she was forced to reside at a place some 14 kilometres distant, named San Stefano Soprano, for a period of two years, after which she returned to Messina. She then began to suffer from ill-health, and came under professional care. The urine was found to exhibit the usual characters of filarial infection, and microscopic examination showed the presence of filariae in it. A similar examination of the blood was then made by night, and more filariae were found.

The author thinks that this case is conclusive proof that filariasis is now endemic in Sicily, having probably been introduced of recent years by emigrants returned from abroad.

J. B. N.

McNAUGHTON (J. G.). Treatment of Filariasis and Elephantoid Conditions by Intramuscular Injections of Salvarsan.—*Jl. Trop. Med. & Hyg.* 1916. Nov. 1. Vol. 19. No. 21. pp. 249-250.

There is much elephantiasis in the Ellice Islands near Samoa [see this *Bulletin*, Vol. 6, p. 355]; probably 20 to 30 per cent. are affected. In five cases salvarsan has been administered with good results. Elephantoid lesions in limbs of at least ten years' standing apparently diminish in size after treatment. The author says, "if other cases react to salvarsan as those I have observed I see no reason why elephantiasis should not be completely wiped out."

In 90 cases of yaws treated with salvarsan and neosalvarsan no elephantoid fever occurred after the injection although elephantiasis is very prevalent in this region.

The cases cited are: (1) Elephantiasis ten years, enlarged scrotum and leg. Attacks of "fever" at least once a month. During an attack 3 gm. salvarsan was injected. No fever since. No filariae now found in blood. Right leg smaller than in 1914.

(2) "Elephantoid fever" recurring at least every two months since 1896. In 1914 both legs had become elephantoid. In 1914 he received 3 gm. of salvarsan. No fever since. Both legs now normal.

(3) Elephantoid fever since 1883 at least every three weeks. In March 1916 3 gm. salvarsan was injected. No fever since, leg slightly smaller.

(4) No visible thickening of scrotum or leg. Has had elephantoid fever for many years. After salvarsan fever and microfilariae disappeared.

(5) Elephantiasis of scrotum, both legs and arms. History dating back twenty years. After removal of scrotum elephantoid fever recurred every ten days. On the day after intramuscular injection of salvarsan this disappeared and has not recurred.

R. T. L.

JOJOT (Ch.). *Aperçu médical sur la campagne du Cameroun de 1914-16.*—*Bull. Soc. Path. Exot.* 1916. Oct. Vol. 9. No. 8. pp. 584-591.

It is noted that guineaworm, hitherto unknown in Cameroon, has been introduced in the course of the campaign and that abscesses due to this worm were common. [It does not appear however from the details given that any of the cases were actually contracted in Cameroon.]

R. T. L.

IRVINE (W. L.). *Topographical Extracts from Annual Sanitary Reports. Monrovia, Liberia; Freetown, Sierra Leone.*—*U.S. Nav. Med. Bull.* 1916. Oct. Vol. 10. No. 4. pp. 725-736. With 1 chart.

At Monrovia all meat is inspected by a sanitary officer prior to consumption. During 1914, 23 bullocks out of 3,742 slaughtered were condemned on account of *Cysticercus bovis*.

Under Freetown the author states that microscopic examination of faeces of 986 patients showed the presence of ancylostome ova in 44.4 per cent. among all classes of patients. The spread of this infection is said to be favoured by the absence of floors in the huts and the habit of going barefooted. During the above investigations four cases of rectal bilharziasis were found. In none was the urinary tract affected. The degree of infection was slight and symptoms were absent. The natives came from four different tribes. These are probably the first recorded cases of *Bilharzia mansoni* in the colony.

Cases of elephantiasis are mostly scrotal and are quite common. Some medical officers estimate the racial incidence of filariasis to be as high as 30 per cent. Microfilariae were found in the night blood in 9.7 per cent. of 964 patients and in 11.8 per cent. of 118 prisoners in Freetown Jail.

R. T. L.

HASSELTMANN (Gustavo E.). *Anatomia e physiologia pathologicae. Pesquisas parasitologicas.*—*Arch. Brasileiros de Med.* 1916. May. Vol. 6. No. 5. pp. 274-279.

In 61 out of 80 autopsies made in Rio de Janeiro a macroscopical examination of the intestines was made. Helminths were found in 83 per cent. of cases. These totalled 3,145 specimens and belonged to the species *Necator americanus*, *Ancylostoma duodenale*, *Trichocephalus trichiuris*, *Ascaris lumbricoides*, *Oxyuris vermicularis* and *Taenia saginata*. The incidence of the various species in each of the 51 cases and the age, nationality, profession and lesions of the individual patients are tabulated.

R. T. L.

SANGIORGI (G.). *Osservazioni sulle feci dei soldati ricoverati negli ospedali militari territoriali di Venezia.* [Observations on the Stools of Soldiers received into the Territorial Military Hospitals of Venice.]—*Giorn. di Med. Milit.* 1916. April 30. Vol. 64. No. 4. pp. 278-281.

The author found ova of intestinal worms in the stools of as many as 1,000 soldiers out of 2,620 examined, being a proportion of 38·13 per cent., the diagnoses of ova found being as follows:—

	Cases.	Per cent.
<i>Ascaris lumbricoides</i> , alone	429	22·4
<i>Trichocephalus trichiuris</i> , alone	389	21·3
<i>Ascaris</i> and <i>Trichocephalus</i> , together	169	—
<i>Anguillula intestinalis</i> , alone	6	0·26
<i>Taenia saginata</i> , alone	3	0·15
<i>Taenia</i> and <i>Trichocephalus</i>	1	—
<i>Ascaris</i> and <i>Anguillula</i>	1	—
<i>Ancylostoma duodenale</i>	1	0·07
Ditto and <i>Trichocephalus</i>	1	—

Statistics are given of the occupations of the soldiers affected, from which it appears that peasants, as might be expected, formed nearly 50 per cent. of the whole. [As, however, it might be assumed that peasants, in a population like the Italian, would numerically predominate in the national army, this criterion is not of much value, statistically.] The men had all been mixed up in the trenches before coming into hospital, so that the dates and modes of their infection could not be determined.

J. B. N.

LANE (Clayton). *The Correct Names of the Helminths of Man.*—*Indian Med. Gaz.* 1916. May. Vol. 51. No. 5. pp. 165-173.

Alterations in the names of parasites, although a constant source of annoyance to medical men, are governed by the rules of zoological nomenclature as a whole. These rules were adopted by the International Zoological Congress for 1901. Later an International Official List of Generic Names was instituted and it was agreed to fix the spelling and authoritatively pronounce upon the priority of certain names. The author has gone over the names of the various helminths

that occur in man and endeavours to arrive at the "correct" name for each species in the light of these recent rulings. In many instances his findings tally with the nomenclature of the more up to date textbooks.

With the literature at his disposal the author says he is unable to explain why RAILLIET and HENRY in 1911 substituted the name *limbata* for [*Ascaris*] *marginata*, a common dog parasite found rarely in man.

The common seat worm *Oxyuris vermicularis* is written as *Oxyuris* (*Oxyurias*) *vermicularis*, indicating that the species belongs to the subgenus *Oxyurias* in the genus *Oxyuris*. Some recent writers in systematic helminthology cite the worm as *Oxyurias vermicularis*, in the belief that it belongs to a genus distinct from *Oxyuris* as now typified by *Oxyuris curvula* in the horse.

Filaria denarquisti appears under the name *F. juncea* recently proposed by RAILLIET, while *Filaria ozzardi* is paragraphed separately, its synonymy with *Filaria juncea* being left unsettled. Similarly the position of *Oesophagostomum brumpti*, although listed under *O. apistomum*, is considered to be undecided. *Triodontophorus deminutus* is left in the original genus; the author is with those who regard the recent classification of the bursate nematodes as to some extent artificial.

As regards *Syngamus kingi* it is [properly] pointed out that CASTELLANI and CHALMERS are in error in identifying this worm with *S. trachealis*. The common whipworm appears as *Trichuris trichiura*, a name given by ROEDERER and WAGLER in 1761. *Gnathostoma siamense* is accepted as a synonym of *G. spinigerum*. *Eustrongylus gigas* of the text books disappears in favour of *Dioctophyme renale* and the familiar *Echinorhynchus gigas* becomes *Gigantorhynchus hirudinaceus*. *Distoma lanceolatum* is now *Dicrocoelium dendriticum* on ODHNER's authority. Amongst the tapeworms we find *Taenia pisiformis*, commonly known as *Taenia serrata*. *Taenia leniaciformis* is, somewhat obscurely, paragraphed separately, but is apparently a synonym of this cysticercus. [That it does not occur in man however is not stated.] The coenurus also is included in the list as the species *Multiceps serialis*.

Taenia echinococcus appears as *Echinococcus granulatus* and *Bothriocephalus latus* as *Diphyllobothrium latum*, the author accepting GEDOELST's view that the broad tapeworm is cogenetic with *D. stemmaphalum* Cobbold. *D. cordatum* is placed in the same genus.

[The printers are apparently responsible for certain unfortunate errors in the list such as *Oncocerca*, *cylanicum*, *Triodonphorus*, *Hoemionchus*.]

R. T. L.

KOLMER (J. A.), TRIST (M. E.) & HEIST (G. D.). **Complement Fixation in Intestinal Parasitism of Dogs.**—*Jl. Infect. Dis.* 1916. Jan. Vol. 18. No. 1. pp. 88-105.

As a result of complement fixation tests with the sera of infested dogs it is believed that there is a production of antibodies, especially in the case of tapeworm infections. It occurs also to a less degree with ascarides and very slightly with whipworm.

A "biologic relation" is said to be revealed between *Ascaris canis* and *Eustrongylus gigas* and between *Taenia serrata* and *Dipylidium caninum*. This points to the probability that complement fixation tests while indicating the presence of a parasite will not differentiate between related species. Similar investigations are being made on the value of complement fixation tests in the diagnosis of intestinal parasitism of man.

R. T. L.

HELMINTHOLOGICAL NOTES.

*East Africa Protectorate.**—The total number of admissions at the native hospital, Mombasa, for the year 1914 from all causes was 2,125. Of these 585 are recorded as suffering from dysentery, diarrhoea and helminthic diseases. Eighty-eight are definitely tabulated as helminthic diseases and of these 27 are reported as having died.

The first hundred examinations of natives, of indigenous races, complaining of intestinal troubles admitted into or attending Hospital showed evidence of helminthiasis in 83 per cent.

In the positive cases the different ova of parasitic worms were found in the following percentage:—

Ankylostomes	46 per cent.
<i>Ascaris lumbricoides</i>	44 "
<i>Trichocephalus dispar</i>	43 "
<i>Taenia saginata</i>	29 "
<i>Schistosomum mansoni</i>	5 "
<i>Oxyuris vermicularis</i>	2 "
<i>Strongyloides stercoralis</i>	3 "

The single case of guineaworm occurred at Meru in an Indian recently arrived from India.

Of the Colony as a whole it is stated that the number of in-patients treated for helminthic diseases during the year in the Government Hospitals was 92 with 36 deaths. Diseases of this class have been observed in all parts of the country. The wide distribution of ankylostomiasis on the Coast Belt has been represented to the military authorities. No case of haematuria is returned.

Uganda Protectorate.†—There were 151 cases recorded under Cestoda, of which 110 are returned as *Taenia saginata* and 41 as *Taenia solium*. Of 1,751 Nematoda, 1,211 cases are classified as *Ascaris*, 135 as *Dracunculus* and 380 as *Oxyuris*.

No case of haematuria is returned.

Zanzibar Protectorate.‡—In the last year's report special attention was drawn to the serious amount of chronic illness and disablement throughout the island from the widespread distribution of hookworm disease.

* *East Africa Protectorate Ann. Med. Rep. for the Year ending 31st Dec., 1914*, pp. 20-21.

† *Uganda Protectorate Ann. Med. & Sanit. Rep. for the Year ended 31st Dec., 1914*. p. 14.

‡ *Zanzibar Protectorate Rep. on Med. Dept. for the Year 1914*. p. 7.

During 1914 out of 185 admissions of in-patients from the African Police 22 were cases of ankylostomiasis.

Two in-patients and 173 out-patients were treated for haematuria; none of these are returned as Bilharzial. It is stated that "many cases are gonorrhoeal from prostatic and urethral congestion and some reported are probably due to Bilharzia, but the figure for out-patients suggests some looseness in diagnosis or an unjustified faith in mere verbal assurances." When cases of bilharzia do occur they practically all originate from villages on the banks of the Mwera River.

Filarial Lymphangitis occurred in 67 cases.

Elephantiasis: 20 in-patients with one death and 118 out-patients.

Elephantiasis of the legs and scrotum is extremely common; of arms, breast, abdominal tissues, scalp, etc., less common.

Cestodes occurred in 35 cases, mainly among mainland natives from their habit of eating meat superficially charred.

Ankylostomiasis. There were 152 in-patients with 11 deaths and 102 out-patients; "the increase of this debilitating infection throughout the Protectorate within the last few years is very serious."

Nyasaland.*—A beginning was made in the North Nyasa district for dealing with ankylostomiasis by the institution of village latrines and the appointment of native sanitary inspectors to supervise the work. It was estimated that quite 95 per cent. of the natives within a radius of 10 to 15 miles of Karonga had adopted deep pit latrines; on the outbreak of war these measures had to be suspended.

Ten cases of infection with *Dracunculus medinensis* are mentioned in the returns of the Zomba Native Hospital. Of these three occurred in females.

Gold Coast.†—The following notes are given under Helminthic Diseases:—

<i>Ankylostomiasis</i> .	1913.	1914.	1915.
Cases ..	22	60	30
Deaths ..	3	4	Nil.

The constant crusade against promiscuous defaecation is the chief preventive measure adopted.

<i>Taenia</i> .	1913.	1914.	1915.
Cases ..	737	716	669

Inspection of meat by the Medical Officer or his deputy is the chief precaution taken against the consumption of "measly" carcasses.

<i>Bilharzia</i> .	1913.	1914.	1915.
Cases ..	17	48	26

<i>Guineaworm</i> .	1913.	1914.	1915.
Cases ..	1,524	1,598	799

	1914.	1915.	Decrease.
Accra ..	375	123	67%
Ashanti ..	385	189	47%
Winnebah ..	249	44	82%

* *Nyasaland Protectorate Ann. Med. Rep. on the Health & Sanit. Condition for the Year ended 31st Dec., 1914.* p. 20.

† *Gold Coast Med. & Sanit. Rep. for the Year 1915.*

The decrease at Accra in 1915 is very striking and is considered as due to the new pipeborne water supply. In Ashanti the decrease corresponds with a reduction in the number of troops stationed at Coomassie and Sunyani, while that at Winnebah is relative only to the decline in the total number of out-patients for the year.

R. T. L.

HOOKWORM CAMPAIGNS (1914).

In 1909 Mr. John D. ROCKEFELLER gave a million dollars to a Commission of thirteen of the leading educators, physicians and business men of the United States, to be used during the ensuing five years towards the eradication of Ankylostomiasis in that country.

In this work the co-operation of the physicians, the educational forces and the press was successfully enlisted. During the five year period 1,273,850 persons were examined and 694,516 were reported to be infected and were treated. About a quarter of a million were treated by the local practitioners working in co-operation with the Commission; the rest were dealt with in temporary dispensaries under the control of specially appointed directors. These country dispensaries had a campaign period ranging from four to eight weeks in each site, a time insufficient to develop satisfactorily the sanitary aspect of the question along with the curative measures.

With growing experience it was found advisable to lengthen the working periods, to limit the area to be worked, and intensify the efforts to put into effect side by side the curative and preventive measures.

In the latter months of the Commission's activities the work proceeded more and more on preventive and "intensive" treatment lines. Their activities not only roused the public authorities and the people in the various states to an appreciation of the fact that ankylostomiasis was widely prevalent as a serious and demoralising infection, but by focussing attention on the part played by soil pollution in the spread of disease generally thereby contributed greatly to the promotion of Public Health interests generally wherever their campaign was conducted.

These results encouraged Mr. ROCKEFELLER to consider an extension of the work and scope of the Commission. In 1913 the Rockefeller Foundation undertook the promotion of public sanitation and the spread of the knowledge of scientific medicine and extended its assistance "for the relief and control of hookworm disease to those countries and peoples where conditions invite."

The first extension of the work outside the United States was inaugurated in 1914 in some of the British Dependencies, where the stability of the government and the official use of the English language made them a most suitable field for beginning work which it was intended later to extend to other countries. Ankylostomiasis is widespread throughout tropical and subtropical regions and it is to be expected that as matters revert to normal conditions the value and importance of the co-operation of the Rockefeller Foundation will be increasingly recognised and utilised. It is intended therefore to devote periodically a section of this *Bulletin* to an account of the various hookworm campaigns in progress from time to time in tropical regions, and to supplement the summaries of the official reports issued by the

International Health Commission with abstracts of the more interesting local details and observations made by the medical officers in charge to the local authorities in their periodical reports.

General Methods.—In each country where work is undertaken it is done under the authority and direction of the Government there. This is regarded as fundamental. The International Health Commission does not undertake the eradication of ankylostomiasis in any country; the infection can only be brought finally under control by means of permanent agencies working over long periods. The Commission therefore, while co-operating with Governments in the work of immediate relief, seeks to do this in such a way as to aid in building up permanent public health agencies for the control of this disease and all other diseases.

Work is begun in each country on a small scale. Opportunity is thus gained without waste of funds to experiment with agencies and methods until they have been properly adapted to local conditions. When the effective working unit for a given locality is arrived at it can be multiplied at will.

Two principal methods have been followed by the Commission. One is known as the Dispensary method, the other as the Intensive method. Their activities tend to develop more and more in the latter direction. The dispensary method is defined as follows: It has three main features, (1) examination and treatments; (2) infection survey; (3) sanitary survey. The "intensive" method requires: (1) operation within a definite area; (2) enumeration of the entire population in this area; (3) examination of the entire population in the area; (4) treatment of all found infected; (5) careful re-examination of every patient under treatment after each weekly course of medicine until a cure is effected; (6) the Government should co-operate with its sanitary organisation to prevent reinfection by providing against contamination of the soil. During 1914 field work was in progress in British Guiana, Antigua, Trinidad, St. Lucia, St. Vincent, Grenada, Panama, Costa Rica, and Egypt.

The total number of persons examined and treated is tabulated in the first annual report of the International Health Commission as under:—

(1). *Examinations and Treatments.*

GENERAL SUMMARY (1914).

	TOTAL	BRITISH GUIANA	TRINIDAD	ST. LUCIA	GRENADA	PANAMA	COSTA RICA	EGYPT
Examined	37902	9481	4528	750	1505	5321	4412	11905
Infected	21483	5562	1635	512	814	2907	3341	6712
Percentage Infected ..	56·6	58·6	36·1	68·2	54·1	54·6	75·7	56·3
Treated	19425	4676	1635	512	1158	2562	3341	5541
Percentage Treated ..	90·4	84·0	100·0	100·0	....	88·1	100·0	82·5
Cured	4981	3701	270	....	....	....	179	831
Percentage Cured ..	25·6	79·1	16·5	....	....	....	5·3	14·9

Further details of the individual campaigns during 1914 and remarks made in their official reports to the local governments by the officers in medical charge are given under each colony.

*British Guiana (1914).**

The first Hookworm Campaign undertaken in a foreign country by the International Health Commission was commenced in British Guiana in the spring of 1914, in the Peter's Hall District on the east bank of the Demerara River, lying just south of Georgetown. The area, which was divided into three parts A, B, and C, is about eight miles long and from one to three miles wide.

In Area A the beginning of treatment was delayed until November owing to radical sanitary work in progress, a relocation of streets and other improvements.

In Area B the campaign commenced in March and extended till December. In the area daily doses of ten grains of thymol were used in the treatment of those infected. At the end of the year there still remained more than 200 cases not yet cured by the daily dose. They were then put on the large weekly dose in use in Areas A and C.

Operations in Area C commenced in September 1914. During the year 9,481 persons were examined out of 10,378 on the census of the district. Of these 5,562 were found to be infected. Up to 31st December 1914, 3,701 or 75·5 per cent. had been cured, while 975 or 19·8 per cent. remained under treatment. [As the work was completed in the following year the detailed statistics of the Peter's Hall District are incorporated with those of 1915 and are tabulated in the summary which will appear under that year.]

Antigua (1914).†

A systematic investigation into the prevalence of ankylostomiasis in Antigua was conducted by Dr. Eric MARSHALL between 1st August and 27th November 1914. His work is summarised in the following table.

* *Rockefeller Foundation. International Health Commission First Ann. Rep.* June 27, 1913–December 31, 1914. [Dr. Wickliffe ROSE, Director-General.] 1915. New York: Offices of the Commission. pp. 41–53.

† *Loc. cit.* pp. 52–56.

Microscopical Examinations.

Estate Districts.	Examined.	Infected.	Percentage of Infection.
Lime Stone Area	547	36	6.5%
Central Plain	689	84	12.1%
Volcanic Area	486	156	32%
Falmouth	20	0	—
English Harbour	46	0	—
Urlins	13	0	—
Johnson Point	17	0	—
Five Islands and Galley Bay ..	21	0	—
Total for Estates	1,839	276	15%
Institutions.			
Prison	70	18	25.7%
Poor House (Males)	39	1	2.5%
" (Females)	57	5	8.7%
Industrial School	35	13	37.1%
Hospital	247	60	24.2%
Lunatic Asylum	48	22	45.8%
Local Cases	158	11	6.9%
Bishop Matthews' School ..	221	6	2.71%
Total for Institutions	875	136	15.5%
Grand Total	2,714	412	15.1%

From the above survey Dr. Marshall draws the following conclusions :

" (1) In certain districts a large percentage of the population are suffering from ankylostomiasis.

" (2) It is the cause of much sickness at the present time.

" (3) Under certain conditions it might become a menace to the health of the whole island.

" (4) At the present time, owing to its distribution, it can be readily dealt with by an intensive campaign.

" (5) It is in some districts of considerable economic importance to the planters.

" (6) It is of vital importance to a large percentage of the labouring population."

Dr. Marshall recommended that laws be passed for the compulsory examination and treatment of all inhabitants, and the construction and maintenance of suitable latrines.

In his "Report on Ankylostomiasis in Antigua," issued as a Government paper in Antigua, Dr. Marshall states that the absence of sanitary arrangements and conveniences is common throughout all the

country districts, so that outside the town area "the actual distribution of the disease is entirely dependent on the climatic and soil conditions influenced by drainage."

In the Lime Stone Area, which consists of the North-West corner of St. John's and the Northern part of St. George's, St. Peter's and St. Philip's Parishes the disease is never likely to be of any economic importance and can never seriously affect the labour output.

In the Central Plain the disease at the present time is not of a serious nature, but owing to the clay soil a series of wet seasons might more seriously affect the health of the population.

If at any time it was decided to establish a system of damming to irrigate the lands in the Lime Stone Area and Central Plain, the disease might become a menace.

In the Volcanic Area, lying to the south of Oyster Bay and the foothills north of Liberta and Grace Hill village, the average rainfall is heavier than elsewhere in the island and the soil in the lower land is mostly heavy clay. This district is the chief centre for "nigger holdings" and at the present time the prevalence and incidence of the disease is a serious menace to the population and economically of some importance.

Dr. Marshall is of opinion that compulsory examination and treatment is the only effective way of dealing with ankylostome infection in Antigua.

*Trinidad (1914).**

Col. J. R. DODD commenced work on August 11th, 1914. A central laboratory and headquarters were opened at San Fernando and branch laboratories at Couva, Princes Town and La Brea.

The work accomplished up to December 31st, 1914, by the combined laboratories is as follows:—

Number of persons examined	..	..	..	4,528
Number of persons treated	..	..	..	1,635
Number of persons reported cured	..	..	..	270
(after microscopical confirmation).				

A partial sanitary survey was made in the localities where work was being carried on: 664 out of 1,636 premises inspected had no latrines, in 96 trenches were used, in 679 cesspits, in 129 pails, and 68 had sheds only.

* *Loc. cit.* pp. 56-58;

Col. DODD in his report (a) for August 1914 states that an examination of all newly arrived immigrants from India allotted to this district revealed an ankylostome infection of exactly 50 per cent., a fact which points to the necessity for treatment before these immigrants are drafted to the estates, if reinfection of treated areas is to be avoided.

In the report (c) for the month of December 1914, it is remarked that the planters in the neighbourhood of San Fernando are endeavouring to meet the requirements of recent legislation by providing latrines for their immigrants living in barracks.

In the reports (b & c) for October, November and December 1914, the following infections with parasites other than ankylostomes are recorded :—

	No. examined.	Ascaris.	Tricho- cephalus.	Strongy- loides.	Tapeworm.
October ..	278	20	42	14	2
November ..	1,420	218	173	--	1
December ..	575	68	20	--	2
Totals ..	2,173	306	235	14	5

*St. Lucia (1914).**

A preliminary investigation into the distribution and prevalence of ankylostomiasis was conducted by Dr. S. BRANCH. The results up to December 31st, 1914 are :—

	Examined.	Infected.	Treated.
Castries (town)	211	97	97
.. (rural)	221	147	147
Babonneau and Gros Islet ..	55	45	45
Cul de Sac Valley	50	41	41
(a) Crown Lands	22	19	19
(b) Ferrands	12	12	12
(c) Soucis	96	82	82
(d) Forestier	40	33	33
Roseau Valley and beyond ..	43	36	36
Total	750	512	512

(a) Report from Col. R. DODD in charge of Ankylostomiasis Operations, International Health Commission, for the month of August, 1914, Trinidad and Tobago Council Paper 144 of 1914.

(b) Report by the Officer in charge for the months of October and November 1914. Trinidad and Tobago Council Paper 195 of 1914.

(c) Report of the Officer in charge for the month of December 1914, Trinidad and Tobago Council Paper No. 2 of 1915.

* *International Health Commission Ann. Rep. for 1914.* pp. 58-9.

*Grenada (1914).**

The campaign was initiated under the Directorship of Dr. Angus MacDONALD on the 28th August. After preliminary arrangements had been made actual work commenced on 1st December. The report to December 31st gives the following results :—

	Examined.	Infected.	Treatments. [Not No. treated.]
Institutions—			
Mount Mortiz	223	153	116
Gouyave	192	94	161
Birchgrove	226	115	150
St. Dominic's	240	140	189
Head Office, Marine Villa ..	624	312	143
			399
Total	1,505	814	1,158

Dr. MacDonald draws the following conclusions :—

1. There is a high rate of hookworm infection in Grenada.
2. All classes (practically), both sexes, all ages, are infected.
3. Present methods of examination indicate an infection of ankylostomiasis to the amount of 74 per cent. of the white peasant settlers in one district, and 64 per cent. of the black population in another. With improved methods of examination, there is no doubt the infection will be shown to be even higher than this.
4. A definite amount of debility, chiefly anaemia, cardiac dilatation and chronic dyspepsia prevails, especially in the more highly infected districts.
5. Dwarfism and infantilism are found amongst those infected, both white and black ; but other causes of these conditions are probably operative.
6. The mode of infection is from the soil (mainly).
7. Drinking of polluted water is general, and the resulting dysenteric diseases complicate and are complicated by ankylostomiasis.
8. Malaria complicates diagnosis and treatment of ankylostomiasis and makes difficult any correct allocation of morbid conditions to the causative disease.

Panama (1914).†

Actual work commenced about July 15th under the directorship of Dr. L. W. HACKETT. Preliminary operations were begun in the City of Panama and subsequently were extended to Chorrera, Arraijan,

* *Loc. cit.* pp. 60-62.

† *Loc. cit.* pp. 63-67.

Capira, and Bocas del Toro, villages in the interior of the Panama Province. The dispensary plan of work was followed. The following is a tabulated summary of results attained to December 31st, 1914:—

(1) *Examinations and Treatments.*

District.	Examined.	Infected.	Treated.
Panama City	928	218	215
Chorrera	812	639	562
Arraijan	582	511	494
Capira	987	830	677
Bocas del Toro	2,012	709	614
Grand Total	5,321	2,907	2,562

Infection in Panama City is lighter than in the interior.

(2) *Infection Survey (Children 6 to 18 years).*

District.	Examined.	Infected.	Percentage of Infection.
Panama City	804	196	24.4%
Interior -			
Chorrera	390	321	82.4%
Arraijan	210	196	93.3%
Capira	340	316	93.0%
Bocas del Toro	695	297	42.8%
Total for Interior ..	1,635	1,130	69.1%
Grand Total	2,439	1,326	54.4%

The Sanitary Survey showed that in Panama City every house within the city limits was connected with a sewer. At Chorrera there were seven privy pits, at Capira one, while there was none at Arraijan. At Bocas del Toro night soil was removed and disposed of in the ocean imperfectly and by a few only.

*Costa Rica (1914).**

Dr. H. R. CARTER, junr., Temporary Director, commenced active operations on 23rd September, 1914. The people were invited to come for free examination and treatment to stations opened at Puntarenas, Esparta, Chomes and Miramar.

* *Loc. cit.* pp. 67-68.

Reports up to December 31st, 1914, give the following summary of results:—

(1) *Examination and Treatments.*

	Examined.	Infected.	Treated.	Cured.
Puntarenas	2,317	1,510		
Esparta	1,260	1,097		[Not listed.]
Chomes.. ..	191	179		
Miramar	644	555		
	4,412	3,341	3,341	

The number reported cured is reduced, as re-examination for a positive determination was often not feasible.

(2) *Infection Survey (Children 6 to 18 years).*

	Examined.	Infected.	Percentage of Infection.
Total for country ..	966	883	91.4

The Sanitary Code of Costa Rica requires that the people provide and use latrines. On August 31st, 1914, a decree was issued rendering funds available for use in making this law effective. The work of sanitation is being carried out in the areas in which the people are being examined and treated.

*Egypt (1914).**

The local Consultative Committee formulated a plan of operations, for one year, which took as the unit of organisation and work the Province Sharqia, one of the 14 into which Egypt is divided. Conditions in Egypt, it is stated, appear to make it necessary to administer treatment to all patients under hospital conditions.

A certain amount of work had been done in hospitals at Qaliub and Qalama in the Qalubia Province. These hospitals were transferred on August 10th to Sharqia Province and were opened in the towns of Belbeis and Minia-el-Qamh. Cases were also treated in the Murad Pasha Hospital at El Deir. The results for the five hospitals are shown on the following page.

**Loc cit.* pp. 69-76.

(1) *Examinations, treatments and cures.*

Province.	District.	No. of persons examined.	No. of persons infected.	No. admitted to hospitals.	No. of persons treated.	No. of persons re-examined.	No. of persons reported cured.
Qaliubia ..	Qaliub } ..	5,222	1,973	2,126	1,686	139	138
	Qalama } ..	688	561	518	459	—	—
Sharqia ..	El Deir..	688	561	518	459	—	—
	Belbeis ..	2,175	1,503	1,432	1,383	267	226
	Minia-el-Qamh..	3,820	2,675	2,180	2,013	514	467
Total ..	—	1,1905	6,712	6,256	5,541	920	831

(2) *Infection Survey* (among the free population and prisoners in Zagazig).

Centre.	Free Population.			Prisoners in Zagazig.		
	Examined.	Infected.	Per cent.	Examined.	Infected.	Per cent.
Zagazig ..	1,256	759	60·4	78	46	58·9
Minia-el-Qamh	1,057	606	57·2	73	61	83·5
Belbeis ..	1,096	546	49·8	49	38	77·5
Faqus ..	868	514	59·2	35	25	71·4
Hehia ..	939	622	66·2	54	43	79·6
Kafr Saqr ..	868	364	42·0	52	41	78·8
Total ..	6,082	3,411	56·08	341	254	74·5

The following details are taken from a report by Dr. MacCALLAN* :—

Thymol is administered on three consecutive days as the fellow cannot spare the time to remain long from home. All cases are treated in travelling hospitals. The cost per head was about 5 dollars or £1 0s. 6d. during the half year ending April, 1914. The percentage

* Preliminary Note on the Ankylostomiasis Campaign in Egypt, 1914, by G. A. F. MacCALLAN, M.D. Read at the Annual Meeting of the British Medical Association, Aberdeen, 1914, and communicated to the Colonial Office.

of haemoglobin in the fellah who is not infected with ankylostomiasis varies from 40 to 80 per cent. ; 60 to 70 per cent. is the amount among those who have not got bilharziasis, those who are so affected have 10 per cent. less haemoglobin. The average rise in haemoglobin under treatment was 19 per cent. at Qualiub (from 34 per cent. to 52 per cent.) and 9 per cent. at Qalama (from 63·2 per cent. to 72·5 per cent.).

Out of 1,291 patients in whom an estimation of the haemoglobin percentage was made, 65 had a percentage of 10 or less than 10 of haemoglobin. In most of the villages and towns of Egypt there are practically no latrines. Up to the present no method of conservancy has appeared to be practicable owing to the habits of the fellah, the density of the population and the low level of the flat delta country.

R. T. L.

BOOK REVIEWS.

FANTHAM (H. B.) [M.A. (Cantab.), D.Sc. (Lond.)], STEPHENS (J. W. W.) [M.D. (Cantab.), D.P.H.] & THEOBALD (F. V.) [M.A. (Cantab.), F.E.S., Hon. F.R.H.S.]. **The Animal Parasites of Man.** Partly adapted from Dr. Max BRAUN'S "Die Tierischen Parasiten des Menschen." (4th Edition, 1908) and an Appendix by Dr. Otto SEIFERT.—xxxii + 900 pp. With 423 figs. 1916. London: John Bale, Sons & Danielsson, Ltd. [Price 45s. net.]

The present work is a comprehensive study of the animal parasites that may infect man. The book is practically a new one, for when the question of a new edition of BRAUN'S "Animal Parasites of Man" was considered, it was found that it was impossible to give an adequate representation of many parts of the subject without practically destroying the original and writing a new book. Much new matter had to be incorporated; numerous alterations were essential and omissions also were necessary. Little of the original matter except historical references remains in the first section on Protozoa, which is new and up-to-date and has been written by Dr. H. B. Fantham. The second section on Worms has been so remodelled by Dr. J. W. W. Stephens that it is practically new, while considerable additions have been made to the third section on Arthropoda, which has been the work of Prof. Theobald. The supplement on treatment, which could not reasonably be expected to be lengthy in a work dealing with the parasites of man as such, has been remodelled in the section dealing with the protozoal diseases, but the sections on helminthic diseases and those provoked by arthropods are stated to be practically a translation of the original.

The work involved has been great. The scientific output during the time that the body of the book was in the press also was large, but the contents have been brought up-to-date by the use of appendices, which are well indexed and give cross references.

An introductory chapter deals with parasitism in general. The characteristics of parasites, their evolution and effects on the host are broadly discussed, while an interesting historical account of the controversy regarding spontaneous generation is included. A list of the more important larger works on parasitology concludes the chapter.

The Protozoa section, pp. 25-210, with its Appendix, pp. 733-752, contains a comprehensive account of the Protozoa directly responsible for disease in man, having potentialities for pathogenicity, or suspected of possibly being injurious to man directly or indirectly. The most recent treatments of the maladies are quoted, with full references to the originals, in the supplement, pp. 617-638.

The Protozoa are described according to their systematic position. A general statement as to the nature of the Protozoa, their body structure, food, movements, inclusions and modes of propagation is given, together with an outline classification containing all the essential features of the classes, Sarcodina, Mastigophora, Sporozoa, Ciliata and Suctoria, with the principal sub-classes of each. There are numerous good, carefully selected and typical illustrations.

The various parasitic members of the Sarcodina are described in detail. The life-cycles of *Entamoeba coli* and of *E. histolytica* in all its phases are given, and DARLING'S work in correlating the various forms receives due credit. An account is also given of *E. gingivalis* (*E. buccalis* of older writers) and of other amoebae such as those found occasionally in urine. There is also a useful summary of the important experimental work on so-called "cultural amoebae" by WILLIAMS and CALKINS. The life-cycles of Chlamydomyces, Paramoeba and Craigia are also given.

Full descriptions of the parasitic members of the Polymastigine and Protomonadine sections of the Mastigophora follow the Sarcodina. Great care has been taken to give all the available details of the morphology and life-history of the genera Trichomonas, Chilomastix (Tetramitus) and

Giardia (Lamblia), now so important as excitants of the various flagellate diarrhoeas and dysenteries. The work of LYNCH on the identity of the Trichomonads found in the mouth, lungs, vagina, urethra and alimentary tract also is quoted, the section being very up-to-date.

Parasitic members of the Cercomonadidae, Bodonidae and Trypanosomidae are discussed in detail, their morphology, life-cycle and biology being described and prophylactic measures indicated wherever possible. A careful account of the various trypanosomes in their vertebrate and invertebrate hosts is presented. In connection with *Trypanosoma gambiense* and *T. rhodesiense*, there is a summary of the animal reactions, action of immune serum, baboon and human serum, trypanolytic reactions and cross immunity experiments, together with references to the original papers. It may be mentioned that, when controversial subjects are dealt with, it is obvious that care has been taken throughout to present the opinions of both sides and full references to the originals are given in footnotes, while care has also been taken to give credit to all workers concerned. The life-cycle of *T. cruzi* in *Triatoma megista* and in man is detailed and the possible confusion of one of its supposed stages with *Pneumocystis* is indicated. The cycles of other trypanosomes are given and the work on the development of arsenic-fast strains of trypanosomes, blepharoplastless trypanosomes and of variations in virulence is both of interest and of practical importance.

The sections dealing with the herpetomonads and *Leishmania* are well and concisely written, and the summary of the experimental work on the transmission of these parasites should be useful. The experimental evidence of the relationship of the herpetomonad and leishmania, and the recent work on induced herpetomoniasis in vertebrates are included, so that the presentation of the subject is very complete. A full account of the morphology, life-history, modes of transmission and cultivation of the *Spirochaetae* and *Treponemata* occurring in man forms an adequate and useful presentation of our knowledge on these important subjects.

The Sporozoa are all parasitic. They are discussed under two groups, the Telosporidia and the Neosporidia, though it is pointed out that the class is possibly not a natural entity, but should be perhaps replaced by two classes of equal rank, corresponding in most respects with the two subclasses named.

The Gregarines, as illustrative of developmental cycles, are briefly described and a more detailed account of the Coccidiidea is given. The life-cycles of *Eimeria* and *Isospora* lately have acquired more significance from the rediscovery of these parasites in man, and the accounts given here of their morphology, with a comparison of the periods necessary for the development of the different stages in animal coccidia are therefore very useful. The Haemosporidia, again, are well described, details of the latest results on the development of *Haemogregarines*, the cultures of human malarial parasites, the differences between the *Plasmodia* infecting man being all indicated in addition to their morphology and life-histories. The work on *Paraplasma*, as the presumed agent of yellow fever, is cited, while a slip inserted records the opinion of the Government Commission that these structures are not the excitants of the disease.

The Neosporidia include two genera known to infect man, namely, *Rhinosporidium* and *Sarcocystis*. A well illustrated account of these organisms is presented, and other members of the group, which may affect man indirectly, are also briefly described. The Ciliata producing dysentery are also described and illustrated, prophylactic measures being indicated. A concise account of the problematic organisms termed Chlamydozoa, embodying a good summary of the various views held as to the nature of these bodies, their characteristics, structure and life-histories, with their association with disease concludes the section.

It may be mentioned that the appendix on Protozoology contains, in addition to notes on recent researches, the formulae of some protozoal culture media and brief notes on general protozoological technique and staining, including formulae of some of the most useful stains and fixatives.

The section on the Worms by Dr. Stephens is subdivided into three parts, dealing with the Trematodes, Cestodes and Nematodes respectively. A general account of the anatomy and life-history of each class precedes

the accounts of the different genera and species. These general accounts are useful, though marred in several instances by ambiguity of expression or construction. There is a scheme of classification given, and throughout there seems to be a constant groping after classification that at times is almost painful, especially when it is remembered that classification is only a mark of our knowledge for the time being. As the life-cycles of many of that assemblage of organisms known as the Vermes are known only in part, and the range of morphological variation among them has received but the scantiest attention, any classification must necessarily be subjected to much revision when a more detailed knowledge of the organisms has been acquired.

The Trematodes parasitic in man are described in some detail. Many of the species have been found in man only on one or two occasions and are rather accidental than habitual parasites of people. Sixteen genera of flukes are described. They include *Watsonius*, *Gastrodiscus*, *Fasciola*, *Fasciolopsis*, *Paragonimus*, *Opisthorchis*, *Paropisthorchis*, *Amphimerus*, *Clonorchis*, *Metorchis*, *Heterophyes*, *Metagonimus*, *Dicrocoelium*, *Echinostoma*, *Artyfechinostomum*, and *Schistosoma*. In the description of the interesting genus *Paragonimus*, there is included the new classification of WARD and HIRSCH, based on the character of the spines. The fine work of the Japanese investigators who worked on *Clonorchis* is detailed, but two species, *C. endemicus* and *C. sinensis*, are retained as separate genera, though the distinctions between them, as has been pointed out, are artificial and hardly justify specific standing. The morphology of the various forms of *Fasciolopsis* are well set forth. The genus *Schistosoma* is described in detail, with a long account of the distribution of the worm in the human body, and the pathological changes resulting therefrom. Two species, *S. haematobium* and *S. mansoni* are differentiated, as occurring in Egypt, as the result of the work of the Bilharzia Mission there in 1915, and an inserted slip gives the morphological characters of the two adult worms, derived from experimentally infected mice. The life-history of *S. japonicum*, the first *Schistosoma* cycle to be established, the work having been done by Japanese investigators, is also set forth.

The Cestoda are treated on the same plan as the Trematoda. The introductory portion consists of anatomical details, with an account of the general lines of development. There are a number of illustrations, but some of the diagrams of cysticercoids and cysticercus development are unnecessarily crude. Six main genera are described. The account of *Dibothriocephalus* is interesting at the present time, owing to the possibility of such infections occurring among prisoners of war and others under war conditions. The genera *Hymenolepis* and *Taenia* are treated rather fully. There are a number of statistics regarding the frequency of cysticerci in pigs in Germany and Austria which also have a topical interest. The same remark applies to the statistics relating to the prevalence of *Echinococcus*. The development of the latter organism is given in great detail.

The Nematoda form a huge group of animal parasites, but fortunately many of them are only occasionally found in man. Nevertheless, those that are frequently found in man have very bad effects upon him. The genera *Dracunculus*, *Filaria*, *Trichuris*, *Trichinella*, *Trichostrongylus*, *Ancylostoma*, *Necator*, and *Ascaris* are, perhaps, the more important. Among the Nematodes, there are some members that need an intermediate host for their full development just as in the Cestodes, but others can develop in one host or pass some of their stages in the soil. Thus, they may be readily confused with other worms, whose whole life is passed in decaying matter in the soil. The life history of *Strongyloides* is given fully and there are some good figures of the various generations. *Dracunculus*, *Ancylostoma* and *Necator* are also described in detail, and some useful figures of forms that might be confused with the larval forms of the last two organisms are given. There is a long account of *Trichinella* and trichinosis which should be of interest to the sanitarian.

The supplement on treatment of helminthic disease is stated on an inserted slip to be practically a translation of the original, and hence does not contain the most recent information on the subject.

Short sections are given to the Acanthocephala, Gordiidae and Hirudinea. The genera *Hirudo* and *Limnatis* are of most importance to man, the latter leech being distributed in North Africa, along the Mediterranean coast, in Syria, Armenia and Turkestan.

The section on the Arthropoda by Prof. Theobald deals with the two chief parasitic groups of the Arthropoda, the Arachnoidea and the Insecta or Hexapoda.

Among the Arachnoidea, the orders Acarina and Linguatulida are considered. The former group of organisms includes many parasitic members that are responsible for various forms of skin complaints, while the ticks responsible for the transmission of spirochaetosis to man and piroplasmosis to cattle are included therein. The life-histories of members of the genus *Trombidium* and *Pediculoides*, associated with autumn erythema [more commonly known as "harvest itch" among harvesters and soldiers] are given, together with an account of the natural habitats of these mites, some of which are found on plants, while others are ectoparasites on insects. The genus *Nephrophages*, with other genera suspected of endoparasitic existence in man, is also noted.

The ticks are divided into the two groups, Ixodinae and Argantinae, a somewhat old classification being employed. A useful synopsis of the different genera is inserted containing the chief characteristics of each genus. The genera *Ixodes*, *Amblyomma*, *Hyalomma*, *Haemaphysalis*, *Dermacentor* and *Rhipicephalus* are described and notes as to their normal hosts are appended. When the genera *Argas* and *Ornithodoros* are dealt with, the tables of species due to NEUMANN are included. These genera have recently undergone much revision, and perhaps in another edition a newer classification, such as that due to NUTTALL and WARBURTON, might be substituted with advantage. Similarly the use of the term "spirilla" for the spirochaetes of African and relapsing fevers should be abandoned. The descriptions of the different species are accompanied by an account of the geographical distribution of each, but prophylactic measures are seldom indicated. The various "itch insects," species of *Glycophagus* and *Sarcoptes*, are described and a list of the *Sarcoptes* species that may be transmitted from domestic animals to man is given, together with the dimensions of the parasites.

Linguatula and Porocephalus are treated somewhat fully, but illustrations of the latter organism are lacking.

The section on the Insecta contains a good general account of the group, alternative classifications being set forth. The forms parasitic in or on man occur among the Rhynchota, Coleoptera and Diptera. The parasitic groups are dealt with in the order given. Among the Rhynchota, lice and bugs are the most important insects from the point of view of dissemination of disease. The account of the body lice infesting man is somewhat short and would probably be revised in a future edition, when the fact that the body louse transmits *Spirochaeta recurrentis* and its varieties, responsible for European and North African relapsing fevers, as well as the virus of typhus, would naturally be included. Species of *Cimex* are also probably responsible for the spread of relapsing fever in Russia. Members of the Reduviidae are frequently a cause of annoyance by means of their bites, but some of them have a more active part in the transmission of disease as has been shown by the work of South American writers. A synopsis based on ROTHSCHILD's classification of fleas is of service for identification purposes.

The best part of the section on Insecta is that dealing with the various mosquitoes. There is a good introductory section with useful illustrations and an interesting account of the general biology of the members of the principal genera. The differences between certain of the larval forms are also indicated. The Culicidae are then studied in detail, the characters of the true mosquitoes being described and tabulated. The long table of differential characters should be welcomed by the systematist. A similar synopsis of the Stegomyiinae, with a more detailed account of *S. fasciata* is given. There are also accounts of the genera Culicoides, and Phlebotomus, which have considerable powers of annoying man.

The house fly is treated as a carrier of dysentery, typhoid, cholera and poliomyelitis and useful notes for decreasing the fly pest are set forth.

The various flies associated with myiasis are described, among them being species of *Chrysomyia*, *Pyronosoma*, *Sarcophaga*, and *Cordylobia*.

Tropical workers will find a classification of the Glossinae of service. There are also good descriptions of the range of *Glossina palpalis* and its haunts and of *G. morsitans*. Both these species are illustrated.

The possible connection of infantile paralysis with attacks of flies is noted in conclusion. The clinical section is concerned mainly with the various forms of "itch" infections and external myiasis.

The book as a whole can be considered to be a very useful work of reference. It covers a large range of subjects which are well illustrated and described. There are a number of new illustrations, some of which were drawn specially for this volume. References to literature are presented in the form of footnotes (which are extremely convenient) for recent work on the Protozoa, a classified list of references to earlier work on the Protozoa, and research as a whole on Worms and Parasitic Arthropoda at the end of the volume. There is a copious index with abundant cross-references. The price, 45s. net, is high, and it is rather to be regretted that the publishers were not able to produce the book at a little less costly rate.

A. Porter.

NEUMANN (R. O.) & MAYER (Martin). *Atlas und Lehrbuch wichtiger tierischer Parasiten und ihrer Ueberträger mit besonderer Berücksichtigung der Tropenpathologie*. Lehmann's Medizinische Atlanten. Vol. XI. vi + 580 + 93 pp. With 45 coloured plates containing 1,300 figs. and 237 text figs. 1914. Munich: J. F. Lehmann. [Price Geb. M.40.]

*This book is chiefly noticeable for the plates with which it is provided, for the text is somewhat restricted in amount and presents an outline of parasitological subjects such as would be useful for the beginner. The scheme of work is to give a short sketch of any parasite likely to be encountered, and of any economic importance, especially in the tropics, and with it, a short outline of its transmitter if there is any. The result is a somewhat disconnected treatment, an account of the trypanosomes being followed by one of Glossinae, succeeded by one of Leishmania and that followed by certain Rhynchota. Such an arrangement does not lead to continuity of thought, nor does it seem even to be a convenient arrangement, for a knowledge of insect transmitters necessitates information on allied groups which should be studied at the same time.

There is a general introduction to the Protozoa, comprising elementary information on the subject and providing definition such as that of the nucleus. It is noted that the German idea of an intermediate host is that of an insect harbouring young forms of the parasite concerned, this idea not being generally adopted. The parasitic amoebae are described and very briefly outlined. There are certain illustrations that are useful, but too few of them. *Entamoeba tetragena* and *E. minuta* are treated as separate entities, and there does not appear to be any correlation of their forms as stages of *E. histolytica*, which is unfortunate. No note is taken throughout this section of other than German work, and the results of DARLING, CRAIG, JAMES and others, though of great importance are never mentioned. The Schaudinnian work receives great prominence.

Among the Flagellates, there are short accounts of *Trichomonas*, *Chilomastix*, *Giardia* and *Prowazekia*, and then for some reason, *Balamididium coli* is interspersed before the trypanosomes are considered. Again German literature is quoted and more recent publications by other European and American workers are not mentioned.

There is a short account of many animal trypanosomes and then an outline of the life-history of *Trypanosoma gambiense* and *T. rhodesiense* is given. While the work of TAUTE on the identity of *T. rhodesiense* is mentioned, that of LAFERAN and MENNIE and their colleagues find no

* This book was received in May 1914. Unavoidable circumstances have prevented an earlier review.—[Ed.]

place. A diversion to the tsetse flies and such genera as *Tabanus* follows, then *Trypanosoma cruzi* is discussed, with some interesting new figures of the rounded and transitional forms of the parasite. There is a section with tables on the trypanosomes of birds, reptiles and fishes, a short account of insect flagellates and then *Leishmania* is described. A section on *Rhynchota* is now intruded in which the bedbug and *Conorhinus* [more correctly termed *Triatoma*] are represented. The Leucocytozoa and Haemoproteus of birds, as set forth by SCHAUDINN, are mentioned and the life-cycle of Coccidia, Haemogregarines, Leucocytozoores, Toxoplasma, Sarcosporidia and Rhinosporidium are given briefly. An account of the technique connected with the preparation of blood films for examination leads up to the study of the malarial parasites, a part of the work given in much greater detail than the rest. The pathology of malaria and black-water fever as a sequel, with the commoner treatments, are set forth. There is a detailed account of the anatomy and biology of the malaria transmitting mosquitoes and of *Stegomyia*, but there are no prophylactic measures indicated, a point that should have received consideration when the biology was discussed, this book having been prepared for tropical workers.

The section on *Babesia* and *Theileria* is succeeded by one on *Spirochaetes*. This again is more accurate than some of the former sections, in that the work of workers other than the authors' fellow countrymen is mentioned. The ticks shown to be inculpaters as transmitters of various diseases are described and then a detailed discussion of the Chlamydozoa is presented.

The Protozoa are succeeded by the Nematoda, discussed from the economic standpoint. The Filariae are treated somewhat fully and instructions for their conservation are given. A diagnostic table of the various filariae and microfilariae is rather more useful than some of those in the book and comprises a large amount of information. Trichinosis is well treated and ankylostomiasis is clearly and adequately set forth. Other genera also are included. The coloured plates of *Ankylostoma* and *Necator* are excellent.

The section dealing with the Cestodes is not so detailed as that on the Nematodes. There is a general introduction and the details of the genus *Taenia* and the *Echinococcus* stage are presented in detail, *Dipylidium* and *Hymenolepis* receiving less attention. There is a longer account of *Dibothriocephalus latius* with some good diagrams.

The Trematoda also are outlined in less detail than the Nematoda, and are given treatment on a similar plan to the Cestodes. A series of outlines of the various flukes is given but its value is not obvious, the scale of the drawings being too small. The account of *Fasciola hepatica* is detailed, but the descriptions of other flukes is less so. While the genera *Clonorchis*, *Fasciolopsis* and *Heterophyes* are thus treated, there is a long account of *Schistosoma*, based chiefly on the work of LOOSS. As the book was published in 1914, the accounts of recent work could not be included, so that reference to current publications or books of 1916 would be necessary to get full information.

Parasitic fly larvae, producing myiasis muscida and myiasis oestrosa are next considered briefly and a short chapter is given to fleas. The latter chapter would be improved by better text figures. Considering the importance of the subject, it is to be regretted that the accounts of the various lice are so scrappy as to be of little use; in fact, *Pediculus vestimentis* alone is given but the scantiest recognition and there are no particulars of its biology, though it is stated that it is concerned with the transmission of recurrent fever and perhaps typhus. Even at the time of publication, the facts with regard to typhus and relapsing fever had been set forth and the omission is regrettable.

A large part of the book is occupied with the plates. The beauty of their execution cannot be denied. They are most charmingly coloured and the reproduction is exquisite. But it is necessary to make one criticism. It would have been far better, in certain cases, to have illustrated the various organisms on a larger scale, and to have given more figures of diagnostic forms. With the small scale employed, it is almost impossible to show the detail that is necessary, thus rendering the representation frequently unlike

the object. The pictures of *Leishmania* furnish an illustration of the bad effects of the smallness of scale. However, it is evident that much care has been expended on the illustrations, and that, in spite of the deficiencies indicated, they form the most useful part of the book.

A. Porter.

DEADERICK (William H.) [M.D.] & THOMPSON (Lloyd). [M.D.]. **The Endemic Diseases of the Southern States.**—546 pp. Roy. 8vo. Illustrated. 1916. Philadelphia & London: W. B. Saunders Co. [Price 21s. net.]

The diseases treated in this book—on the endemic diseases of the Southern States—are, malaria, blackwater fever, pellagra, amoebic dysentery, hook-worm disease, and "other intestinal parasites." They are what we should call, with the exception of pellagra, tropical diseases. Of recent years it has become common knowledge that the Southern of the United States are severely visited by some of the so-called tropical diseases. Hook-worm infection is so prevalent and causes so much loss of health and efficiency that in 1909 the Rockefeller Sanitary Commission was formed to deal with this specific problem and in 1910 work was started in nine States. In a recent survey of six of the Southern States for malaria of over 13,000 blood examinations 13.28 per cent. showed malarial parasites (von Ezdorff). Pellagra, in the present state of uncertainty as to its causation, must be causing much anxiety to the public health authorities. NILES gives 14 states, a compact south-eastern group, as "among the states where pellagra has assumed formidable proportions." He believes that "a present estimate of forty thousand pellagrins in the United States is not far from correct," and the significance of this figure, in itself not very great, is that a few years ago only a few cases were known.

To come to the work under review, the authors say in their preface that the diseases described are not confined to the states of the South, but are more prevalent there than in the North. Whether the Southern, and especially the south-eastern States, owe the prevalence of these diseases, or at least those of them that are parasitic, to their climate or to the large proportion of negroes in the population or to a combination of these causes, is not discussed by the authors. The low standard of hygiene of the negro population must tend to depress the general average, and it is notorious that the black man with his parasites, given proximity and means of transmission, is a danger to the white. The matter is probably complex. The limitation set themselves by the authors recalled to the reviewer a recent paper by CRAIG on the tropical diseases of the United States [see this *Bulletin*, Vol. 6, p. 422]. He mentions, in addition to those dealt with in this book, relapsing fever and dengue, the latter as occurring commonly in the Southern States, and undulant fever. Deaderick and Thompson say they have purposely excluded filariasis.

Malaria (by Dr. Deaderick) occupies 180 pages, every one of which is interesting. It is the south-eastern states in which the disease is most prevalent, the chief malaria carriers being *A. maculipennis* Meigen and *A. crucians* Wied. Dr. Deaderick considers parthenogenesis of macrogametes as well established. He thus explains long periods of incubation and relapses at long intervals. He frequently refers to it, as in such picturesque passages as the following:—"The conquest of the schizonts seems to be a signal for the macrogametes to lay aside the conventional way of slow sexual reproduction and to conscript recruits rapidly by parthenogenesis." Elsewhere he says, Relapses at long intervals can be explained by parthenogenesis alone.—He does not refer to the views of ROSS and JAMES, nor to the work of D. THOMPSON on the persistence of schizonts through the apyretic intervals. Indeed here as in some other details the section is not so much up to date as the title page would lead one to expect.

In the chapter on diagnosis the author discusses the important clinical question: In what proportion of cases is the parasite to be found at a single examination? His own experience is that "in localities in which half of the malarial subjects take quinine in some form before consulting a

physician the parasite can be detected at a single examination of the peripheral blood, taken at random with respect to the stage of parasitic growth, in approximately one-third of the cases only." He regards a mononuclear leucocytosis reaching 15 per cent. as strong evidence of malaria, a point worth noting because CASTELLANI and CHALMERS say: A marked mononuclear increase may arouse suspicion, but by itself is quite useless [in diagnosis].—* The urobilin test is not mentioned, nor does the author discuss the diagnosis of latent malaria.

Treatment gets full consideration in 22 pages. The hypodermic method of administration of quinine, by which is meant the intramuscular method, is employed by Dr. Deaderick in pernicious malaria where patients cannot swallow or retain the drug. He refers to the "certainty and promptness of absorption," but here he must expect to meet critics. He stresses the need of dilute solutions and uses a gram of the bimuriate in 10 cc. of water.

If one may judge from the fact that the first five of the excellent illustrations in the chapter on prophylaxis show water barrels, the breeding of Anopheles in such containers must be commoner in the Southern States than it generally is in the tropics. As to prophylactic quinine Dr. Deaderick writes:—The Koch method [one gram of quinine] every sixth and seventh day has been satisfactory in my hands—but whether this method has succeeded apart from other prophylactic measures we are not told.

Blackwater fever (by Dr. Deaderick) occupies 53 pages. Discussing the comparatively recent appearance of this disease the author notes that "the early pyretologists almost completely ignored the condition of the urine in fevers." The disease was first described in the United States in 1859, in Louisiana. Eleven states are mentioned in which it is found. In the account of its geographical distribution the statement is found, "Crosse says that it is increasing in certain parts of West Africa," the reference (at the end of the book) being to a work published in 1899. Is not this a little misleading? Surely the author could have obtained more recent information. A similar reference to New Guinea bears date 1895. The cause of blackwater is discussed at some length. The author considers malaria as "essentially and solely the predisposing cause," and in some cases also as the exciting cause; he is disposed to regard the haemolysis as a phenomenon of anaphylaxis. The mention of calcium chloride in the chapter on treatment as recommended by VINCENT in 1905 is interesting because it has recently been advised by BURKITT [this *Bulletin*, Vol. 7. p. 29].

The authors collaborate in the sections on pellagra (104 pages) and amoebic dysentery (43 pages). Pellagra is now found in thirty-nine of the forty-eight states of the Union. A chart of distribution from LAVINDER is given. An interesting chapter is that on aetiology, where there is a good account of GOLDBERGER's views. In referring to his feeding experiment upon convicts on the Mississippi State Penitentiary farm the authors suggest that it would have been more convincing had it been conducted in a pellagra-free territory; it is to be hoped that this can be arranged, though one should not forget that the experiment was well controlled. In the chapter on clinical history we find "SANDWITH who so religiously holds to the spoiled corn theory . . . considers, etc.," the reference being to his book published in 1905. The passing of a decade has given this author time to be converted to other views [see e.g., this *Bulletin*, Vol. 7. p. 50]. In the chapter on prophylaxis the authors give the details of GOLDBERGER's diet and say that, whether his theory is true or not, they consider his tenets sound. As to drugs they recommend arsenic and especially sodium cacodylate intramuscularly, "usually in 3-grain doses daily." They have a good word also for autoserotherapy, in which a man receives hypodermically the fluid from his own, artificially produced, blister. In this Section are many useful illustrations of the skin eruption.

The amoebic dysentery section is more "up to date" than malaria. *Endamoeba histolytica*, as the organism is called after LEIDY, was first detected in the United States in 1890; the disease is said to be endemic

* CASTELLANI and CHALMERS. *Manual of Tropical Medicine*. 2nd Edition, 1913. London: Baillière, Tindall and Cox. p. 890.

in most of the Southern States. A full account is given of how to stain the entamoeba in faeces and in the tissues. The plate of *E. histolytica* would gain in value if figures of *E. coli* were there for comparison, but the main differentiating features are provided in a table. Special attention is drawn to the latent cases, such as those described by MUSGRAVE in the Philippines, in which symptoms of dysentery are absent. Since cats can be artificially infected, the authors would prohibit the keeping of them in endemic centres. The account of treatment by emetin is sufficient, but our knowledge of this subject grows daily.

Hookworm disease and "other intestinal parasites" (by Dr. Deaderick) occupy 42 and 33 pages respectively. The credit for the discovery that ankylostomiasis is endemic in the Southern States is given to STILES (1902); the States in question are all those south of the Ohio and Potomac rivers and Arkansas, Louisiana and Texas. A table from the 1913 Report of the Rockefeller Sanitary Commission shows that of 700,734 persons examined 248,221, or 35 per cent. were found infected. Surface closets and soil pollution, as is well known, are largely responsible. The chief victims are agriculturists and cotton mill operatives, the last probably owing to the insanitary condition of their homes. In the chapter on prophylaxis a diagram of the Lumsden Roberts-Stiles, or barrel, privy is given, which is regarded as ideal for rural homes; it embodies the principles of the septic tank. For the new world hook worm the name *Uncinaria americana* is, in several passages, retained.

The parasites described in the last chapter are, *Taenia saginata*, *T. solium*, *Hymenolepis nana*, *H. diminuta*, *Strongyloides intestinalis*, *Ascaris lumbricoides*, *Oxyuris vermicularis*, *Trichuris trichiura*, and *Balantidium coli*, the last heading being Myiasis intestinalis. Large and clear figures are given in illustration. The author regards intestinal worms as potential factors for evil, and quotes STRIT to the effect that when the prisoners of Bilbid prison infested with worms were quarantined the death-rate fell from 75 to 9 per mille. The details of this experiment have been given by HEISER in a recent paper [see this *Bulletin*, Vol. 8, p. 194]. Of 3,000 prisoners 60 per cent. harboured hookworms and 90 per cent. "some form of intestinal parasite." By thorough treatment of the prisoners, in batches of about 300, the death-rate was reduced as aforesaid. It would seem probable that Dr. Deaderick should have quoted it in the hook worm section. It appears that *Taenia solium* is rare in the south, "far rarer than either the beef tapeworm or the dwarf tapeworm." The dwarf tapeworm is the commonest cestode. The author says that the hosts of this worm are man and certain species of rats and mice; the part played by rodents is usually considered doubtful. [See page 512 of this number.]

An appended list of references contains 547 entries.

The book is well produced. Practitioners in the tropics will find it somewhat heavy to hold, but the clear type is compensation. There are few printer's errors; they chiefly occur in proper names. *Salol* on page 394 (four lines from bottom) should probably be *thymol*. The book can be thoroughly recommended as containing an attractively-written, full and accurate account of the diseases with which it deals and as being much more interesting than a textbook. It is especially a book for the clinician.

A. G. B.

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[Trifling contribution.]

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[The work consists very largely of an historical resumé of trichomoniasis, more especially as it has been observed in South America. The history and geographical distribution are now noted. A fairly full account of the symptoms compiled from the accounts of other authors, such as Brumpt, Castellani and Chalmers, Escomel, is given, the chief new point being that one of the characteristics of trichomonas dysentery is its tendency to pass into the chronic state. The pathology and morbid anatomy are discussed from the historical standpoint. A poor account of the morphology and life-history of *Trichomonas* is given. There are numerous inaccuracies in spelling, e.g., p 55, *Hexa Mastix* Andri Deiteil is the rendering of *Hexamastix Ardin Delteilli*, while *Ardil* Deiteil, Brump, Chatterger, all occur and in some cases are repeated. The account of treatment is a compilation on the same plan as the rest of the book.]

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- CLELAND & BRADLEY. [Discussion on Dengue].—*Med. Jl. of Australia*, 1916. May 6. Vol. 1. 3rd Year. No. 19. pp. 386-387.
- GAITAN U. (A.). Fiebras biliosépticas.—*Repertorio de Med. y Cirug.*, 1916. June. Vol. 7. No. 9. (No. 81.) pp. 387-405.
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- ROBB (R. M.). Heat Fever (Non-Infective Cerebro-spinal Fever).—*S. African Med. Rec.*, 1916. May 27. Vol. 14. No. 10. pp. 154-155.
- SPAAR (Eric C.). Notes on a Further Case of Fever due to *Bacterium columbense*.—*St. Bart. Hosp. Jl.*, 1916. Feb. Vol. 23. No. 5. pp. 61-62.
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- . Some Notes on the Encysted Larva of the Lung Distome.—*Jl. Parasit.*, 1916. June. Vol. 4. No. 2. pp. 175-180. With 4 figs.

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- BECKER (J. G.). A Preliminary Note on an Intermediate Host of *Bilharzia haematobium* in the Transvaal, together with a Description of the Cercariae with which the Mollusc is infected.—*Med. Jl. of S. Africa*, 1916. Apr. Vol. 11. No. 9. p. 156. With 1 plate.
- BURRES (W. T.). Intestinal Bilharziosis in Western Panama.—*Amer. Jl. Trop. Dis. & Prevent. Med.*, 1916. May. Vol. 3. No. 11. pp. 611-612.
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- . Some Observations on the Possible Intermediary Hosts of Schistosoma in Natal.—*Jl. Trop. Med. & Hyg.*, 1916. July 1. Vol. 19. No. 13. p. 154. With 4 figs.
- [The subject matter of this note has already been reviewed in this *Bulletin*—vide Vol. 7. No. 6, and Vol. 8. No. 3.]
- . The Prevention of Bilharzia Infection. [Correspondence].—*Lancet*, 1916. July 15. p. 121.
- . The Duration of Bilharziosis in South Africa.—*Brit Med Jl.*, 1916. July 29. p. 144.

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ELMENDORF (M. F.) & WALKER (J. E.). Hookworm History Schedules of Two Male Patients treated with Oil of Chenopodium at the U.S. Marine Hospital, Wilmington, N.C.—*Virginia M. Semi-Month*, 1915-16. Vol. 20. pp. 552-555. [*Index Medicus*.]

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NICOLLE (Charles). Chronique du kala azar en Tunisie.—*Arch. Inst. Pasteur Tunis*, 1916. Apr. 1. Vol. 9. No. 3. pp. 176-179.

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THÉZÉ (J.). Pathologie de la Guyane française. (Lèpre, Filariose, etc.). Rapport sur les Travaux de l'Institut d'Hygiène et de Bactériologie, 1914-1915. V. La Lèpre.—*Bull. Soc. Path. Exot.*, 1916. July. Vol. 9. No. 7. pp. 449-469.

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[This is merely an editorial review of Professor Ascoli's book with the above title.]

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[The observations here recorded are not to any extent observations, in the literal sense, of natural fact, but are mainly conjectures and speculations which, though interesting, can hardly be summarised.]

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—. Le paludisme des Caravanes.—*Malariologia*, 1916. June 30. Ser. 2. Ann. 2. No. 3. pp. 73-79. With 2 figs. & a Map.

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SARASI LAL SARKAR. Some Studies in Malaria in Nadia District. Monthly Variation of Malaria.—*Indian Med. Gaz.*, 1916. Apr. Vol. 51. No. 4. p. 140. With 2 charts.

[In the Nadia District of Eastern Bengal the mortality from malarial fever rises from July to November, and then generally falls, to rise again usually in April, but sometimes in March or May. Generally the least humid months are the most malarious, but in the author's opinion no useful generalizations can be made regarding the relation between fever-mortality and climatic conditions.]

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—. Assainissement antipaludique et amélioration agricole simultanées et rapides d'une région infectée par un ancien lit de rivière (Oued Djer. Algérie).—*Bull. Soc. Path. Exot.*, 1916. July. Vol. 9. No. 7. pp. 504-509. With 1 plate & 3 figs.

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[The paper consists of a "condensed summary of our present knowledge relative to the function of the louse in typhus-fever epidemics, and the methods employed for the destruction of the insect during the present war in Europe." It contains an account of the presumed causal agent of typhus, of certain biological characteristics of lice and a number of the methods for the destruction of lice, as set forth in papers by Austrian and German workers, whose papers along with others on the same topic have already been reviewed in this Bulletin. The photographs illustrate the various forms of field disinfection of men and clothing that have been in use from time to time.]

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Entomological.

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Protozoology (excluding Amoebae, Leishmania and Trypanosomes).

- BRUG (S. L.). Morphologische Studien an *Proteosoma prascox*.—*Arch. f. Schiffs u. Trop. Hyg.*, 1916. Vol. 20. pp. 289-306.
- CARINI (A.). Ueber die Hundekrankheit Nambi-uyu und Ihren Parasiten *Rangelia vitalis*.—*Cent. f. Bakt.*, 1. Abt. Orig., 1915. Dec. 29. Vol. 77. No. 3. pp. 265-271. With 2 coloured plates.

[This is a German translation of a paper by Carini and Maciel originally written in Portuguese and summarised in this *Bulletin*, Vol. 6, p. 196. There are a few extra figures, but nothing essentially new.]

- CARINI (A.) & MIGLIANO (L.). Sur un Toxoplasme du cobaye (*Toxoplasma caviae* n. sp.).—*Bull. Soc. Path. Exot.*, 1916. July. Vol. 9. No. 7. pp. 435-436.
- CHALMERS (Albert J.) & PEKKOLA (Wainö). A New Human Intestinal Flagellate in the Anglo-Egyptian Sudan.—*Jl. Trop. Med. & Hyg.*, 1916. June 15. Vol. 19. No. 12. pp. 142-146. With 3 figs.
- CHATTON (Edouard) & BLANC (Georges). Un pseudo-parasite *Oryctoplasma rhicephali* Chatton et Blanc.—*C. R. Soc. Biol.*, 1916. May 20. Vol. 79. No. 10. p. 402.
- FANTHAM (H. B.) & PORTER (Annie). The Significance of Certain Natural Flagellates of Insects in the Evolution of Disease in Vertebrates.—*Jl. Parasit.*, 1916. June. Vol. 2. No. 4. pp. 149-166.
- & —. The Pathogenicity of *Giardia (Lamblia) intestinalis* to Men and to Experimental Animals.—*Brit. Med. Jl.*, 1916. July 29. pp. 139-141.
- FEDOROVITCH (A. I.). Hémoparasites trouvés dans un cas de fièvre chronique.—*Ann. Inst. Pasteur*, 1916. May. Vol. 30. No. 5. pp. 249-250. With 3 plates.
- GALLI-VALERIO (B.). Are Sarcosporidia aberrant Forms of Cnidosporidia of Invertebrates?—*Jl. of Parasitol.*, 1916. Mar. Vol. 2. No. 3. pp. 126-128.
- KOFOID (Charles Atwood) & CHRISTIANSEN (Elizabeth Bohn). 1. On *Giardia microti* Sp. Nov. from the Meadow Mouse. 2. On Binary and Multiple Fission in *Giardia muris* (Grassi).—*Univ. California Publicat. Zool.*, 1915. Nov. 19. Vol. 16. No. 2. pp. 23-29. With 1 text fig. No. 3. pp. 30-54. With 4 plates and 1 fig.
- MACASKILL (D. C.). Flagellate Infection in Caries of the Jaw.—*Jl. Trop. Med. & Hyg.*, 1916. June 15. Vol. 19. No. 12. p. 146.
- McCULLOCH (Irene). An Outline of the Morphology and Life History of *Critidia leptocoidis*, Sp. Nov.—*Univ. California Publicat. Zool.*, 1915. Sept. 16. Vol. 16. No. 1. pp. 1-22. With 4 plates and 1 text fig.
- de MELLO (Froilano). Quelques considérations sur les affinités zoologiques du genre "Haemocystidium," avec description d'une espèce nouvelle.—*Anais Scientif. da Faculdade de Med. do Porto.*, 1916. Vol. 3. No. 1. 11 pp. With 1 plate.
- MIGONE (L. E.). Un nouveau flagellé des plantes: *Leptomonas Elmasiani*.—*Bull. Soc. Path. Exot.*, 1916. June. Vol. 9. No. 6. pp. 356-359.
- PLIMMER (H. G.). Notes on the Genus *Toxoplasma*, with a Description of Three New Species.—*Proc. Roy. Soc.*, 1916. Aug. Vol. B. 89. No. B 616. pp. 291-296. With 2 plates.
- RUSSELL (B. R. G.). Intestinal Disorders arising from Protozoal Infection.—*Lancet*, 1916. June 10. pp. 1161-1163.
- VAN SACEGHEM (R.). Observations sur des infections naturelles par *Toxoplasma cuniculi*.—*Bull. Soc. Path. Exot.*, 1916. July. Vol. 9. No. 7. pp. 432-434. With 1 fig.
- SADI DE BUEN. Sobre la morfología y significación de los cuerpos de Kurloff, de los mononucleares del cavia.—*Bol. Inst. Nac. de Hig. de Alfonso XIII.*, 1916. Mar. 31. Vol. 12. No. 45. pp. 1-16. With 2 coloured plates.

[A review of the various hypotheses held as to the nature of the Kurloff bodies, together with some of the author's own results, whereby he is led to consider the structures to be defensive reaction products. The plates contain 38 figures.]

SHAW-MACKENZIE (J. A.). The Action of Copper Salts on Protozoa.—*Med. Press & Circ.*, 1916. July 19. Vol. 102. No. 4028. pp. 50-52.

TRIBONDEAU (L.), FICHET (M.) & DUBREUIL (J.). Procédé de coloration des liquides organiques et de leurs parasites.—*C. R. Soc. Biol.*, 1916. Apr. 1. Vol. 79. No. 7. pp. 282-287.

[The procedure is based on the use of eosinate of methylene blue treated with silver and ordinary eosinate of methylene blue dissolved together in alcoholic glycerine. Methylene blue treated with silver (in the form of silver oxide made by the action of potassium hydroxide on silver nitrate) is already known and has been used under the name of Borrel blue. The colouring materials are, then, pure medicinal methylene blue, aqueous eosin and Borrel blue. Those recommended are all of French manufacture. Full details are given in the paper as to the mode of preparation of the various solutions and their combination. Those interested should consult the original.]

WATSON (Minnie E.). A New Infusorian Parasite in Sand Fleas.—*Jl. of Parasitol.*, 1916. Mar. Vol. 2. No. 3. pp. 145-146. With 5 figs.

APPLIED HYGIENE IN THE TROPICS.

BLUE (Rupert). Resolutions concerning Disposal of Human Excreta at Unsewered Homes.—*U.S. Public Health Rep.* Suppl. No. 22. 1915. June 18. 2 pp.

BULLETIN DE L'OFFICE INTERNATIONAL D'HYGIÈNE PUBLIQUE, 1916. July. Vol. 8. No. 7. pp. 1142-1150.—La Mission sanitaire de la Marine Royale Italienne à Valona en 1914-1915.

GALAINÉ (C.) & HOULBERT (C.). Sur le self-diffuser à anhydride sulfureux pour la désinfection et la dératisation des tranchées, des cales de navires et des locaux habités.—*C. R. Acad. Sci.*, 1916. Mar. 6. Vol. 162. No. 10. pp. 363-365.

NICHOLSON (M. A.). The Purification of the Water-Supply of the Lawrence Military Asylum, Sanawar, by Means of Bleaching Powder.—*Indian Med. Gaz.*, 1916. July. Vol. 51. No. 7. pp. 248-256.

NYDEGGER (J. A.). School Hygiene. Survey of Schools in Manatee County, Fla.—*U.S. Public Health Rep.*, 1915. July 30. Suppl. No. 25. 35 pp.

PARKER (E. G.). Sanitation of American Samoa.—*U.S. Nav. Med. Bull.*, 1916. July. Vol. 10. No. 3. pp. 563-567.

ROMANO (Angelo). Bonifica idraulica temporanea a turno periodico e suoi effetti. Per la bonifica del fiume Oreto (Palermo).—*Ann. d'Igiene.*, 1916. Feb. 20. Vol. 26. No. 2. pp. 76-92. With 1 coloured plate and 4 figs.

[An account of the results of canalizing the bed of a small stream, named the Oreto, near Palermo, in order to maintain a constant flow of water in hot weather, so as to prevent the development of mosquitoes. Nothing of general interest is contained in this paper and, as can be seen from the illustrations, the stream itself is a mere brook.]

de VOGEL (W. Th.). Report about the Investigations carried out with Regard to the Sanitary Condition of the Port of Sibolga, Residency Tapanoceli, from 24th April until 6th May, 1913 [Also in Dutch.]—*Mededeelingen van den Burgerlijken Geneesk. Dienst in Nederl.-Indië*, 1915. Vol. 4. pp. 62-98. With 2 maps, 2 charts and 10 figs.

See also under Disease Headings.

LIST OF REFERENCES.

[Continued from BULLETIN, Vol. 8, pp. i.-xxxii.]

For the benefit of recipients of the Bulletin, who wish to make a Card Catalogue, or to preserve a consecutive record of the references on any subject, galley proofs [*'Korrekturbogen'*; *'Première'*] of the Quarterly Lists of References (printed on one side of the page) can be supplied at the subscription price of Two Shillings per annum. They are obtainable from the beginning of 1914 onwards. Application should be made direct to the Bureau.

AMOEBIASIS (including Entamoebic Dysentery and Liver Abscess).

BRUG (S. L.). Pigment und andere Einschlüsse in Dysenterieamöben.—*Arch. f. Schiffss- u. Trop.-Hyg.*, 1916. Vol. 20. pp. 433-436. With 4 figs.

CADE (A.) & VAUCHER (E.). Amibiase dysentérique autochtone. Trois cas d'abcès du foie. *Bull. et Mém. Soc. Med. des Hôpit. de Paris*, 1916. July 13. 3 ser. Vol. 32. No. 23-24. pp. 1042-1048.

[Three cases of amoebic abscess of the liver, of no special interest except that they were contracted in France.]

CECIKAS (J.). Verlauf der Amöbendysenterie in Griechenland. — *Wien. Klin. Woch.*, 1916. Aug. 10. Vol. 29. No. 32. pp. 1009-1010. [No new facts.]

DALE (H. H.). The Treatment of Amoebic Dysentery Carriers. Note on the Use of the Double Iodide of Emetine and Bismuth.—*Jl. Roy. Army Med. Corps*, 1916. Aug. Vol. 27. No. 2. pp. 241-244.

DOBELL (Clifford). Incidence and Treatment of *Entamoeba histolytica* Infection at Walton Hospital.—*Brit. Med. Jl.*, 1916. Nov. 4. pp. 612-616.

EICHHORN (Adolph) & GALLAGHER (Bernard). Spontaneous Amebic Dysentery in Monkeys.—*Jl. Infect. Dis.*, 1916. Sept. Vol. 19. No. 3. pp. 395-407. With 6 text figs.

JEPPS (Margaret W.). Note on Some Examinations and Treatments for *Entamoeba histolytica* Infections.—*Brit. Med. Jl.*, 1916. Nov. 4. pp. 616-617.

KILGORE (A. R.). Peripheral Neuritis following Emetin Treatment of Amebic Dysentery.—*Boston Med. & Surg. Jl.*, 1916. Sept. 14. Vol. 175. No. 11. pp. 380-382.

LARIMORE (Joseph W.). Endemic Endamebic Dysentery.—*Interstate Med. Jl.*, 1916. Sept. Vol. 23. No. 9. pp. 742-751.

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[This paper merely calls attention to the fact, apparently for the first time, that amoebic dysentery occurs in Southern Spain.]

MITCHELL (O. W. H.), CULPEPPER (W. L.) & AYER (W. D.). *Endameba buccalis* in the Mouths of Institutional Children.—*Jl. Med. Res.*, 1916. Sept. Vol. 35. No. 1. Whole No. 158. pp. 51-53.

RISQUEZ (Jesús Rafael). Una complicación poco frecuente del absceso hepático.—*Gaceta Med. de Caracas*, 1916. Aug. 31. Vol. 23. No. 16. pp. 121-122.

WEMYSS (H. L. Watson). A Case of Amoebic Abscess of the Liver.—*Edinburgh Med. Jl.*, 1916. Oct. New Ser. Vol. 17. No. 4. pp. 255-258.

See also Dysentery (unclassified).

BERIBERI AND POLYNEURITIS AVIUM.

BAUJEAN (R.). Epidémie de polynévrite palustre simulant le bérubéri.—*Bull. Soc. Path. Exot.*, 1916. Oct. Vol. 9. No. 8. pp. 634-647.

EIJKMAN (C.). Invloed van de voeding en van voedselonthouding op het ontstaan van polyneuritis gallinarum. Naar gemeenschappelijk met Dr. C. J. C. van Hoogenhuyze ingestelde onderzoekingen medegedeeld.—*Geneesk. Tijdschr. v. Nederl.-Indië*, 1916. Vol. 56. No. 3. pp. 257-294.

FINDLAY (G. Marshall). Note on a Case of Beri-Beri.—*Lancet*, 1916. Oct. 7. pp. 646-647.

HOLMES (B.) & RETINGER (J.). An Apparent Recovery of a Chicago Chinaman from Beriberi after Three Doses of Vitamine containing Extract of Rice Polishings.—*Illinois Med. Jl.*, 1916. Vol. 29. pp. 178-180. [*Index Medicus.*]

LHERMITTE (J.). Les lésions cérébrales de la polynévrite avitaminique (Béri-Béri experimental).—*Rev. Neurologique*, 1916. July. Vol. 23. No. 7. pp. 6-8.

MEIRELLES (E.). Atravez do beriberi na casa de detença.—*Tribuna Med.*, 1915. Vol. 21. pp. 147; 161. [*Index Medicus.*]

SILVADO (J.). Critica da theoria verminosa do beriberi.—*Tribuna Med.*, 1916. Vol. 21. pp. 219, 239, 251. [*Index Medicus.*]

VEDDER (Edward B.). The Known and the Unknown with Regard to the Etiology and Prevention of Beriberi.—*Milit. Surgeon*, 1916. Oct. Vol. 39. No. 4. pp. 368-379.

WILLCOX (William Henry). Beriberi—With Special Reference to Prophylaxis and Treatment.—*Jl. Roy. Army Med. Corps*, 1916. Aug. Vol. 27. No. 2. pp. 191-202.

[Paper is same in facts as that published in the *Lancet* and reviewed in this *Bulletin*, Vol. 7. p. 372.]

BLACKWATER FEVER.

MARCANDIER (André). La résistance globulaire dans quelques cas de paludisme, de fièvre bilieuse hémoglobininurique et de maladie du sommeil.—*Bull. Soc. Path. Exot.*, 1916. Oct. Vol. 9. No. 8. pp. 647-665.

MAURY (Carlotta J.). A Reputed Specific for Blackwater Fever.—*Science*, 1916. N.S. 43. p. 349. [*Index Medicus*.]

OTT (William O.). Hemoglobinuric Fever treated by Infusions containing Quinin.—*Jl. Amer. Med. Assoc.*, 1916. Sept. 16. Vol. 67. No. 12. pp. 872-874. With 1 chart.

CHOLERA.

AZZI (Azzo). Reazioni del vibrione de colera e di altri germi con sostanze coloranti decolorate.—*Riforma Med.*, 1916. Aug. 21. Vol. 32. No. 34. pp. 921-924.

BERTARELLI (E.). La diagnosi sperimentale del colera e le lacune del metodo ufficiale.—*Gazz. Med. Lomb.*, 1916. Vol. 75. pp. 37-39: and *Morgagni*, 1916. Vol. 58. Pt. 2. Jan. 11. No. 3. pp. 43-47.

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[An account of ROGERS' work on cholera therapy from 1895-1915. Nothing new.]

FLU (P. C.). Enkele opmerkingen naar aanleiding van de "beschouwingen" van Dr. de Raadt.—*Geneesk. Tijdschr. v. Nederl.-Indië*, 1916. Vol. 56. No. 3. pp. 244-256.

GALAMBOS (A.). Erfahrungen uber die Cholera asiatica.—*Therap. d. Gegenw.*, 1915. Vol. 56. pp. 452-456.

GIBSON (H. Graeme). A New Solid Medium for the Isolation of the Cholera Vibrio. *Brit. Med. Jl.*, 1916. Sept. 30. pp. 454-455 and *Jl. Roy. Army Med. Corps*, 1916. Sept. Vol. 27. No. 3. pp. 354-356.

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KNOPI (Eduard). Ueber den Verlauf der Choleraerkrankungen im Gefangenenlager X.—*München. Med. Woch.*, 1916. Aug. 15. Vol. 63. No. 33. pp. 1207-1209. With 3 text figs.

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LAMAS (L.). Estudio comparativo entre los vibriones del cólera y los vibriones de "El Tor."—*Bol. Inst. Nac. Higiene de Alfonso XIII.*, 1916. Sept. 30. Vol. 12. No. 47. pp. 131-163.

LEVI della VIDA (Mario). Alcune osservazioni di profilassi anticolerica in un Ospedale militare contumaciale.—*Ann. d'Igiene*, 1916. Oct. 31. Vol. 26. No. 10. pp. 631-641.

MASSI (U.). Il liquido ascitico nella diagnosi del vibrione de Koch.—*Bull. Soc. Med. di Bologna*, 1916. New Ser. Vol. 4. pp. 69-73 [*Index Medicus*.]

MENDELSON (Ralph W.). Experiences with the Use of Combined Vaccines in the Present War, with Special Reference to the Tetravaccine Typhoid + Paratyphoid A + Paratyphoid B + Cholera.—*Milit. Surgeon*, 1916. Oct. Vol. 39. No. 4. pp. 361-367.

[Substantially identical with CASTELLANI and MENDELSON's paper in the *British Medical Journal* (this *Bulletin*, Vol. 7, p. 256).]

MOROSCHI (Carlo). Iniezioni antitifiche ed anticoleriche a scopo profilattico.—*Policlinico*, Sez. Med. 1916. Nov. 1. Vol. 23. No. 11. pp. 393-398.

NICHOLSON (M. A.). A Note on Cholera Inoculation carried out on the North-West Frontier, 1915.—*Indian Med. Gaz.*, 1916. Sept. Vol. 51. No. 9. pp. 338-340.

[No information to be obtained from the paper.]

PANCAZIO (F.). Per la diagnosi del colera asiatico.—*Gaz. d. Osp. e d. Clin.*, 1916. Aug. 31. Vol. 37. No. 70. pp. 1090-1094. With 4 text figs.

[A short description of the typical clinical features of the disease, its differential diagnosis from cholera nostras and arsenical poisoning, together with a brief account of the various media recommended for the isolation of the vibrio and the part played by carriers.]

PERGOLA (M.). Il sangue nella preparazione dei comuni substrati nutritivi come sostituto del peptone nella diagnosi batteriologica del colera.—*Igiene Mod.*, 1916. Vol. 9. pp. 33-38. [*Index Medicus*.]

de RAADT (O. L. E.). Eenige beschouwingen naar aanleiding van de verhandeling van den heer P. C. Flu: "Epidemiologische studiën over de cholera te Batavia 1909-1915."—*Geneesk. Tijdschr. v. Nederl.-Indië*, 1916. Vol. 56. No. 3. pp. 237-243.

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SEIDL (C.). Insectos como factores das epidemias; a disseminação da cholera pelas moscas.—*Ann. Acad. de Med.*, 1910 do Rio de Jan. 1915. Vol. 78. pp. 77-85. [*Index Medicus*.]

DYSENTERY (Bacillary and Unclassed).

(A.) Bacillary.

BOUDET (Gabriel). Une épidémie de dysenterie bacillaire observée pendant l'été de 1915, à Gneret (Maroc Oriental).—*Presse Méd.*, 1916. June 29. No. 36. pp. 281-284. With 6 curves.

[A simple account of an epidemic. Nothing new.]

HEHEWERTH (F. H.). Ueber Dysenteriebacillen und ihre Einteilung in Gruppen.—*Cent. f. Bakt.* 1. Abt. Orig., 1916. May 9. Vol. 78. No. 1. pp. 3-5. With 3 text figs.

———. Over dysenteriebacillen en de indeeling in groepen.—*Geneesk. Tijdschr. v. Nederl.-Indië*, 1916. Vol. 56. No. 4. pp. 470-489.

KUHN (Philalethes). Die Bedeutung der Paraagglutination für die Diagnose des Typhus und der Ruhr.—*Med. Klinik*, 1916. July 23. Vol. 12. No. 30. pp. 791-792.

NICOLLE (M.), DEBAINS (E.) & LOISEAU (G.). Etudes sur le Bacille de Shiga.—*Ann. Inst. Pasteur*, 1916. Aug. Vol. 30. No. 8. pp. 363-382.

SCHIEHMANN (O.). Ueber Schwierigkeiten bei der serologischen Diagnose der Shiga-Kruse-Ruhr und über Modifikation der Technik der Agglutination.—*Berlin. Klin. Woch.*, 1916. Sept. 25. Vol. 53. No. 39. pp. 1079-1080.

UMNUS (O.). Die Serumagglutination in der Ruhr und Pararuhrdiagnostik.—*Med. Klinik*, 1916. July 2. Vol. 12. No. 27. pp. 723-725.

USENER (W.). Zur Klinik der Bacillenruhr und ihrer Behandlung mit Atropin.—*Berlin. Klin. Woch.*, 1916. July 17. Vol. 53. No. 29. pp. 799-801.

(B.) Unclassed.

de ALMEIDA (Waldemar). Considerações clinicas sobre o tratamento das dysenterias.—*Arch. Brasileiros de Med.*, 1916. June. Vol. 6. No. 6. pp. 334-338.

[Brief notes, suggesting that the present-day use of sera in the case of bacillary dysentery, and of emetine in that of amoebic, does not entirely do away with the necessity of symptomatic medication by means of drugs. The author gives a list of the prescriptions that he commonly uses for this purpose, none of them very novel.]

BARRATT (J. O. Wakelin). A Search for Dysentery Carriers among Soldiers coming from Gallipoli and Egypt.—*Brit. Med. J.*, 1916. Nov. 4. pp. 617-619.

DETRE (Ladislau). Ein Fall von Lambliainfektion des Darmes.—*Wien. Klin. Woch.*, 1916. Aug. 10. Vol. 29. No. 32. pp. 1010-1012. With 4 text figs.

[The paper contains a poor and inaccurate account of the morphology of the flagellate and encysted stages of *Giardia intestinalis*, as observed in a single case by the author in Pozsony. He refers to the organism by the old names of *Lambliia* and *Megastoma*, while the description of the mature cysts, as well as that of the young cysts, is quite incompatible with the accounts of other workers on the subject in most respects.]

ELLIOTT (John B.). Clinical Report of a Case of Diarrhoea apparently due to Flagellate Parasites. *New Orleans Med. & Surg. J.*, 1916. Oct. Vol. 69. No. 4. pp. 308-311.

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[An abstract of a report by Professor Kuriazides which has been already noticed in this *Bulletin*.]

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di MATTEI (Eugenio). Il reperto batteriologico delle secrezioni catarrali della vie respiratorie, nelle varie specie di peste cutanea. *Malaria e Malat. d. Paesi Caldi*, 1916. July Aug. Vol. 7. No. 4. pp. 225-229.

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WILLIAMS (C. L.). Diagnosis of Plague in Rats. The Advisability of making Routine Microscopic Examinations of Rats, Supplementary to the Macroscopic Examination.—*U.S. Public Health Rep.*, 1916. Aug. 18. Vol. 31. No. 33. pp. 2199-2205.

RELAPSING FEVER (and Spirochaetosis).

BABES (V.). Hémorragies méningées et autres manifestations hémorragiques dans la fièvre récurrente.—*C. R. Soc. Biol.*, 1916. Oct. 21. Vol. 79. No. 16. pp. 855-857.

GANE (T.) & BUFA (I.). Sur les phénomènes méningitiques pendant la fièvre récurrente chez les enfants.—*C. R. Soc. Biol.* 1916. Oct. 21. Vol. 79. No. 16. pp. 864-865.

GWYN (N. B.) & OWER (J. J.). Infective Jaundice (Spirochaetosis Ictero-Haemorrhagica). A Preliminary Report.—*Lancet*, 1916. Sept. 16. pp. 518-519. With 4 text figs.

KNACK (A. V.). Zur Diagnose des Rekurrensödems. Bemerkungen zur Arbeit von Weltmann: Beitrag zur Klinik der sogenannten Oedemkrankheit.—*Wien. Klin. Week.*, 1916. Aug. 10. Vol. 29. No. 32. pp. 1015-1016.

[A discussion as to the likelihood of oedematous conditions being really symptoms of spirochaetosis. The author seems to prefer serum reactions and blood examinations in diagnosis, as oedema is not universally present in cases of relapsing fever. His views probably are safer than those who contend that oedema is sufficient for diagnosis of spirochaetosis.]

MARTIN (Louis) & PETTIT (Auguste). Trois cas de spirochétose ictéro-hémorragique en France.—*Bull. Acad. Méd.*, 1916. Oct. 10. Vol. 76. Year 80. No. 40. pp. 247-253. With 2 text figs and 1 chart.

SANGIORGI (Giuseppe). Sugli spironemi della bocca.—*Pathologica*, 1916. Sept. 15. Vol. 8. No. 188. pp. 283-285. With 8 text figs.

STOKES (Adrian) & RYLE (John A.). A Note on Weil's Disease (Spirochaetosis Ichterohaemorrhagica) as it has occurred in the Army in Flanders.—*Brit. Med. J.*, 1916. Sept. 23. pp. 413-417. With 13 charts and 3 text figs; and *Jl. Roy. Army Med. Corps*, 1916. Sept. Vol. 27. No. 3. pp. 286-299. With 13 charts.

URBAIN (Gaston). Méningo-encéphalo-myérite des poules (? spirillose).—*Bull. Soc. Path. Exot.*, 1916. Oct. Vol. 9. No. 8. pp. 561-563.

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BRAULT (J.). Note sur le *Trichophyton luxurians*, nouvelle espèce à culture faviforme, produisant des kériens.—*Ann. de Dermat. et de Syph.*, 1916. Mar. Vol. 6. No. 2. pp. 91-99. With 2 text figs.

— & VIGUIER (A.). Les champignons des teignes rencontrées à Alger.—*Ann. de Dermat. et de Syph.*, 1916. July. Vol. 6. No. 4. pp. 169-185. With 3 text figs.

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CHALMERS (Albert J.) & ARCHIBALD (R. G.). A Sudanese Maduromycosis.—*Ann. Trop. Med. & Parasit.*, 1916. Sept. 30. Vol. 10. No. 2. pp. 169-222. With 4 plates.

— & CHRISTOPHERSON (J. B.). A Sudanese Actinomycosis.—*Ann. Trop. Med. & Parasit.*, 1916. Sept. 30. Vol. 10. No. 2. pp. 223-282. With 4 plates.

CHIEFFI (Alessandro). La tigne nella provincia di Napoli.—*Giorn. Ital. d. Malat. Ven. e d. Pelle*. 1916. July 26. Vol. 57. No. 3. pp. 140-169.

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JOHNSON (L. W.). A Case of Gangosa.—*U.S. Nav. Med. Bull.*, 1916. Oct. Vol. 10. No. 4. p. 667.

LOW (G. C.) & NEWHAM (H. B.). A Case of Ulcerating Granuloma successfully treated by Intravenous Injections of Antimony.—*Brit. Med. J.*, 1916. Sept. 16. pp. 387-389.

McNAIR (James B.). The Pathology of Dermatitis Venenata from *Rhus diversiloba*.—*Jl. Infect. Dis.*, 1916. Sept. Vol. 19. No. 3. pp. 418-428. With 7 text figs.

——. The Transmission of Rhus Poison from Plant to Person. *Rhus diversiloba* T. and G.—*Jl. Infect. Dis.*, 1916. Sept. Vol. 19. No. 3. pp. 429-432.

da MATTA (Alfredo Augusto). Diagnóstico diferencial del Granuloma ulceroso y su tratamiento por el Emético.—*Gaceta Med. de Caracas*, 1916. July 31. Vol. 23. No. 14. pp. 105-107.

[A paper read before the Academy of Medicine of Venezuela on the subject indicated by the title, not containing anything very novel, though giving a good exposition of the facts.]

RICONO (M.). Tinea bovina—Sitsua (Basuto) Mna (Kaffir).—*S. African Med. Rec.*, 1916. July 22. Vol. 14. No. 14. pp. 212-216. With 2 plates.

——. Cases of Fibroma molluscum and Cheloid.—*S. African Med. Rec.*, 1916. Aug. 12. Vol. 14. No. 15. pp. 228-231. With 1 plate.

ROSS (Philip H.). Dermatitis due to the Secretion of a Beetle in British East Africa.—*Jl. Trop. Med. & Hyg.*, 1916. Sept. 1. Vol. 19. No. 17. p. 202.

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STRICKLER (Albert). Differential Blood Counts in Parasitic Skin Diseases and their Possible Significance. *Jl. Cutan. Dis. including Syph.* 1916. Oct. Vol. 34. No. 10. Whole No. 409. pp. 752-757.

TORRES (Octavio). Observação de um caso de actinomicose: 2 caso observado na Bahia.—*Brazil Medico* 1916. July 15. Vol. 30. No. 29. pp. 225-228.

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SLEEPING SICKNESS (and other Trypanosomiasis).

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DUKE (H. Lyndhurst). Trypanosomiasis in Northern Uganda.—*Jl. of Hygiene*, 1916. Sept. Vol. 15. No. 3. pp. 372-387. With a map.

KOFOID (Charles Atwood) & McCULLOCH (Irene). On *Trypanosoma triatomae*, a New Flagellate from a Hemipteran Bug from the Nests of the Wood Rat *Neotoma fuscipes*.—*Univ. California Publicat. Zool.*, 1916. Feb. 18. Vol. 16. No. 10. pp. 113-126. With 2 plates.

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NOVAES (Eucario). La trypanosomiasse brésilienne et son rapport avec le corps thyroïde. Travail fait à l'Institut pathologique de l'Université de Genève.—*Rev. Méd. de la Suisse Romande*, 1916. Sept. 20. Vol. 36. No. 7. pp. 592-614. With 2 plates.

VAN SACEGHEM (R.). Contribution à l'étude de la transmission du *Trypanosoma casaboui*.—*Bull. Soc. Path. Exot.* 1916. Oct. Vol. 9. No. 8. pp. 569-573.

VELU (H.) & EYRAUD (R.) Trypanosomiasse des chevaux du Maroc. Infestation d'un jeune chien par l'allaitement.—*Bull. Soc. Path. Exot.* 1916. Oct. Vol. 9. No. 8. pp. 567-568.

TUBERCULOSIS IN NATIVE RACES.

MICHIE (H. Clay). A Tuberculosis Survey of an Alaska Eskimo Village. Using Children under the Age of 15 Years as an Index.—*Med. Record*, 1916. Oct. 14. Vol. 90. No. 16. Whole No. 2397. pp. 663-666. With 4 figs.

TYPHUS.

ARCHIVES DE L'INSTITUT PASTEUR DE TUNIS. 1916. Sept. Vol. 9. No. 4. pp. 215-290. With 62 charts.—Nouvelles études sur le typhus exanthématique pratiquées à l'Institut Pasteur de Tunis et dans les formations sanitaires de la Régence (1916.) [NICOLLE, BLAIZOT, POTEL & POIRSON.]

BABES (V.). Sur le diagnostic différentiel entre le Typhus exanthématique et certaines formes hémorragiques de méningite cérébro-spinale.—*C.R. Soc. Biol.* 1916. Oct. 21. Vol. 79. No. 16. pp. 857-860.

BLATTEIS (S. R.) & LEDERER (M.). The Bacillus of Typhus Exanthematicus isolated from a Case of Typhus Fever (Brill's Disease).—*Long Island Med. J.*, 1916. Vol. 10. pp. 168-172. [*Index Medicus*.]

BOUYGUES (Julien). Traitement du typhus exanthématique et du typhus récurrent par l'or et l'argent à l'état colloïdal.—*Presse Méd.*, 1916. Sept. 7. No. 49. pp. 391-392. With 6 charts.

BULLETIN DE L'OFFICE INTERNATIONAL D'HYGIÈNE PUBLIQUE. 1916. July. Vol. 8. No. 7. pp. 1103-1141.—L'épidémiologie du typhus exanthématique dans les dernières années.

[A French translation of an article by Dr. Bruce Low (see this *Bulletin*, Vol. 8, p. 56).]

CHESNEY (Lilian Mary). Typhus Work in Serbia.—*Practitioner*, 1916. May. Vol. 96. No. 5. (No. 575). pp. 542-550.

FELIX (Artur). Die Serodiagnostik des Fleckfiebers.—*Wien. Klin. Woch.*, 1916. July 13. Vol. 29. No. 28. pp. 873-877.

[An account of the value of the serodiagnosis of typhus as tested with a new strain of bacillus cultivated by him. The strain is termed strain X,19 and has been prepared in the German University at Prague.

FRIEDBERGER (E.). Kritische Bemerkungen zur Aetiologie des Fleckfiebers.—*Berlin. Klin. Woch.*, 1916. Aug. 7. Vol. 53. No. 32. pp. 882-888.

[A general account of the work of many recent workers on typhus].

GASBI (U.) & GIUGNI (Fr.). Tifo esancemático (Tifo petecchiale-Dermotifo). Pubblicazioni monografiche delle malattie degli eserciti in guerra della Scuola delle malattie esotiche annessa alla R. Clinica Medica di Roma.—*Malaria e Malat. d. Paesi*, Caldi, 1916. July-Aug. Vol. 7. No. 4. pp. 263-281. With 6 text-figs.

[An account of typhus on the lines of a modern textbook, embodying the recent researches of many workers, reviewed in greater detail in this *Bulletin*.]

HAIGHT (H. H.). Endemic Typhus Fever in Toronto.—*Canadian Pract. & Rev.*, 1916. May. Vol. 41. No. 5. pp. 185-191.

HAMBURGER (R.). Beitrag zur Unterscheidung von Typhus- und Fleckfieberroseolen.—*München. Med. Woch.*, 1916. June 27. Vol. 63. No. 26. pp. 952-953.

[A discussion of the opinions of various German workers on the differences of the rash in typhus and typhoid. No new features are given.]

HOEFFERN (Heribert Ritter) & DESCHMANN (Rudolf). Beobachtungen über Fleckfieber.—*Wien. Klin. Woch.*, 1916. June 29. Vol. 29. No. 26. pp. 820-821. With 5 charts.

[An account of some of the phenomena seen in 78 cases of typhus in Volhynia during January to March 1916. No new features appear to be described.]

KANNGIESSER (Friederich). Die Seuche des Thukydides (Typhus exanthematicus).—*Zeitschr. f. Hyg. u. Infektionskr.*, 1916. Aug. 18. Vol. 82. No. 1. pp. 184-195.

[A synopsis of the symptoms, diagnosis, prophylactic measures, prognosis and therapy of typhus, in the baldest form, with long quotations from the works of Thucydides to show that these clinical features had been described in his writings. The work has no practical value.]

KER (Claude B.). Recent Literature on Typhus.—*Practitioner*, 1916. Sept. Vol. 97. No. 3. pp. 238-245.

[An account of some of the relatively recent work on typhus, all of which has been reviewed in this *Bulletin* from time to time. Bacteriology and epidemiology are more especially dealt with and reference is made to the review by Dr. Bruce Low (see this *Bulletin*, Vol. 8, p. 56) on the latter subject.]

MCNEIL (H. L.). Endemic Typhus Fever in South Texas.—*Texas State Jl. Med.*, 1916. Aug. Vol. 12. No. 4. pp. 188-191.

——. A Case of Typhus.—*Texas State Jl. Med.*, 1916. Sept. Vol. 12. No. 5. p. 234.

[A report of a case of illness, probably typhus, observed at Galveston, in which it was believed that a pure culture of Plotz's bacillus was obtained on ascites-agar. Agglutination tests with positive sera had not been performed at the time of communication of the notes, but the author believes that the culture obtained was that described by Plotz as the agent of typhus.]

NICOLLE (C.) & BLAIZOT (L.). Sur les résultats de la sérothérapie dans le traitement du typhus exanthématique.—*Bull. Acad. Méd.*, 1916. Aug. 1. Vol. 76. Year 80. No. 31. pp. 95-101.

—— & ——. Sur la préparation d'un sérum antiexanthématique expérimental et ses premières applications au traitement du typhus de l'homme.—*Ann. Inst. Pasteur*, 1916. Sept. Vol. 30. No. 9. pp. 446-454. With 8 charts.

[This paper covers much the same ground as a previous one (see this *Bulletin*, Vol. 8, p. 62) with the addition of longer accounts of the cases treated and the reproduction of the temperature charts of some of the cases.]

NOELLER (W.). Beitrag zur Flecktyphusübertragung durch Läuse.—*Berlin. Klin. Woch.*, 1916. July 10. Vol. 63. No. 28. pp. 778-780.

PÉTROVITCH. Considérations épidémiologiques et cliniques sur l'épidémie de typhus exanthématique au cours de la guerre actuelle en Serbie.—*Bull. Acad. Méd.*, 1918. Sept. 19. Vol. 76. Year 80. No. 37. pp. 206-209.

PIERCE (C. C.). Typhus Fever: Prevention and Control.—*Texas State Jl. Med.*, 1916. Aug. Vol. 12. No. 4. pp. 182-188.

——. Typhus Fever.—*Bull. El Paso Co. Med. Soc.*, 1916. Vol. 8. pp. 173-176. [*Index Medicus.*]

WEIL (E.) & FELIX (A.). Ueber die Beziehungen der Gruber-Widalschen Reaktion zum Fleckfieber.—*Wien. Klin. Woch.*, 1916. Aug. 3. Vol. 29. No. 31. pp. 974-978.

ZEMANN (W.). Komplikationen und Erkrankungen im Bereiche der oberen Luftwege und des Ohres bei Fleckfieber.—*Wien. Klin. Woch.*, 1916. Aug. 10. Vol. 29. No. 32. pp. 1014-1015.

YAWS.

HARPER (Philip). The Late Sequelae of Framboesia.—*Lancet*, 1916. Oct. 14. pp. 678-679.

YELLOW FEVER.

BREINL (A.). Le Diagnostic de la fièvre jaune.—*Bull. Office Intern. d'Hyg. Publique*, 1916. Sept. Vol. 8. No. 9. pp. 1455-1464.

[Translated from Commonwealth of Australia Quarantine Service Publication No. 6. See this *Bulletin*, Vol. 7, p. 294.]

CROPPER (John Westray). Report on the Examination of Human Blood in England for the Presence or Absence of "Seidelin Bodies." (*Paraplasma flavigenum*, the so-called Parasite of Yellow Fever).—*Yellow Fever Commission (W. Africa)*. Reports on Questions connected with the Investigation of Non-Malarial Fevers in West Africa, 1916. Vol. 3. pp. 243-249. With 1 plate.

[The salient features of this Report were incorporated in a later paper by CROPPER and DREW (this *Bulletin*, Vol. 7. p. 298).]

Le FANU (G. E. H.). Some Observations on Fevers investigated in Quittah, March to June, 1914.—*Yellow Fever Commission (W. Africa)*. Reports on Questions connected with the Investigation of Non-Malarial Fever in West Africa, 1916. Vol. 3. pp. 261-291.

STERNBERG (G. M.). Researches relating to the Etiology of Yellow Fever.—*Pan.-Amer. Soc. & Med. Jl.*, 1916. Vol. 21. No. 4. pp. 16-20. [*Index Medicus.*]

MISCELLANEOUS.

CLIMATIC BUBO, RAT BITE DISEASE, ROCKY MOUNTAIN SPOTTED FEVER, SCORPION STING.

da MATTA (Alfredo Augusto). Yodoterapia endovenosa en el Bubon Tropical.—*Gaceta Med. de Caracas*, 1916. July 31. Vol. 23. No. 14. pp. 107-109.

OLIVER (B. Chone). Scorpion Bite. [Correspondence].—*Med. Missions in India*, 1916. July. Vol. 22. No. 86. p. 71.

PIZZA (C.). Un nuovo caso di Soddoku.—*Morgagni*, 1916. Feb. 29. Vol. 58. Pt. 1. No. 2. pp. 67-80.

TREMBLY (C. E.). Climatic Bubo.—*U.S. Nav. Med. Bull.*, 1916. Oct. Vol. 10. No. 4. pp. 661-663.

UNITED STATES PUBLIC HEALTH REPORTS, 1916. Oct. 6. Vol. 31. No. 40. pp. 2753-2754.—Rocky Mountain Spotted Fever in California.

WOLBACH (S. B.). The Etiology of Rocky Mountain Spotted Fever. Occurrence of the Parasite in the Tick. (Second Preliminary Report).—*Jl. Med. Res.*, 1916. Sept. Vol. 35. No. 1. Whole No. 158. pp. 147-150.

ANNUAL REPORTS.

ASSAM. Annual Vaccination Returns of the Province of Assam for the Year 1915-1916 with Brief Explanatory Notes. [By Major T. C. McCOMBIE YOUNG, I.M.S., Sanitary Commissioner, Assam.]—17 pp. 1916. Shillong: Printed at the Assam Secretariat Printing Office. [Price 11 annas=1s. 0d.]

BIHAR & ORISSA. Administration Report on the Jails of Bihar and Orissa for the Year 1915. [By Lieut.-Col. B. J. SINGH, I.M.S.]—20 + lxxxvii + 2 pp. fcap. 1916. Patna: Bihar & Orissa Govt. Press. [Price R.1 or 1s. 6d.]

BIHAR & ORISSA. Annual Returns of the Hospital and Dispensaries in Bihar and Orissa for the Year 1915. With Notes. [By Colonel G. J. H. BELL, C.I.E., M.B., I.M.S.]—5 + ciii. pp. fcap. 1916. Patna: Bihar & Orissa Govt. Press. [Price R.2-8 or 3s. 9d.]

BURMA. Report on the Prison Administration of Burma for the Year 1915.—103 pp. 1916. Rangoon: Office of the Superintendent, Government Printing. [Price R.2-8.0=3s. 9d.]

CENTRAL PROVINCES & BERAR. Notes on Vaccination in the Central Provinces and Berar for the Year 1915-16.—3 + xix. pp. fcap. 1916. Nagpur: Government Printing Press. [Price R.1=1s. 6d.]

CENTRAL PROVINCES & BERAR. Annual Sanitary Report of the Central Provinces and Berar for the Year 1915.—1916. Nagpur: Printed at the Government Press. [Price R.1=1s. 6d.]

PUNJAB. Notes on Vaccination in the Punjab for the Year 1915-16. [By H. HENDLEY, M.D., K.H.S., I.M.S.]—4 + xiv pp. fcap. 1916. Lahore: Supt. Govt. Printing. [Price R.0-9.0 or 9d.]

PUNJAB. Report on the Sanitary Administration of the Punjab and Proceedings of the Sanitary Board for the Year 1915. [By H. HENDLEY, M.D., K.H.S., I.M.S.] and the Report on Sanitary Work for 1915. [By V. STANTON.]—20 + xli pp. fcap. 1916. Lahore: Supt. Govt. Printing. [Price R.1.2.0 or 1s. 8d.]

ROCKEFELLER FOUNDATION. International Health Commission. Second Annual Report. Jan. 1, 1915-Dec. 31, 1915. 185 pp. With 21 figs. 1916. Jan. New York: Offices of the Commission.

BOOKS.

DEADBERRY (William H.) [M.D.] & THOMPSON (Lloyd) [M.D.]. The Endemic Diseases of the Southern States.—546 pp. Roy. 8vo. Illustrated. 1916. Philadelphia and London: W. B. Saunders Co.

MAXWELL-LEFROY (H.) [M.A., F.Z.S.]. Measures for Avoidance and Extermination of Flies, Mosquitoes, Lice and Other Vermin.—17 pp. With 5 figs. 2nd Edit. Revised for the Tropics. 1916. London: W. Thacker & Co., Calcutta & Simla: Thacker, Spink & Co. [Price 1s. net.]

SIMPSON (W. J.). [C.M.G., M.D., F.R.C.P.]. The Maintenance of Health in the Tropics.—xi+174 pp. With 26 figs. 2nd Edit., 1916. London: John Bale, Sons & Danielsson. [Price 3s. 6d. net.]

UNCLASSIFIED.

ARCE (Julian). La Medicina Tropical. Lección inaugural.—*Cronica Med.* Lima. 1916. Aug. Vol. 33. No. 638. pp. 239-248.
[An address, couched in general terms, on the development of tropical medicine in recent years.]

ARLO (J.). La méningite cérébro-spinale à Kindia, Guinée française (janvier-avril 1916).—*Bull. Soc. Path. Exot.* 1916. Oct. Vol. 9. No. 8. pp. 551-556. With 3 charts.

BARONSFATHER (C. G. S.). Alcohol in the Tropics. [Correspondence].—*Lancet*, 1916. Oct. 14. p. 692.

BRAHMACHARI (Upendra Nath). The Preparation of Stable Colloidal Antimony. [Correspondence].—*Lancet*, 1916. Oct. 21. p. 728.

CANTLIE (James). Anatomical Data concerned in Operations on the Liver and in Clinical Examinations.—*Trans. Soc. Trop. Med. & Hyg.*, 1916. July. Vol. 9. No. 8. pp. 222-233. With 8 figs.

CARNOT (P.) & de KERDREL. La Pneumococcie épidémique des tropicaux.—*Paris Méd.*, 1916. July 8. Vol. 6. No. 28. pp. 37-43.

CARTER (D. W.). Jr. Hematochyluria. Observations on the Fat Content of the Urine and the Pathology of the Condition.—*Arch. Intern. Med.*, 1916. Oct. 15. Vol. 18. No. 4. pp. 541-550. With 3 figs.

CASTELLANI (Aldo). The Treatment of Certain Diseases of Protozoal Origin by Tartar Emetin, alone and in Combination.—*Brit. Med. J.*, 1916. Oct. 21. pp. 552-553.

CHAIX. Notes médicales à propos de mon séjour en Serbie.—*Bull. Acad. Méd.*, 1916. Feb. 22. 3 ser. Vol. 75. Year 80. No. 8. pp. 231-233.

[A brief account of the author's experiences in Serbia, April-October, 1915. Typhus, relapsing fever, diphtheria and malaria were the chief diseases seen. No details.]

CHALMERS (Albert J.) & MARSHALL (Alexander). Equine and Bovine Streptococci as Causal Agents of Human Infection.—*Jl. Trop. Med. & Hyg.*, 1916. Sept. 15. Vol. 19. No. 18. pp. 213-215; Oct. 2. No. 19. pp. 225-228.

ESCOMEL (Edmundo). Sobre un caso de blastomicosis.—*Cronica Med.* Lima. 1916. July. Vol. 33. No. 637. pp. 210-213.

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[A short account of the observations will be found in this *Bulletin*, Vol. 8. p. 217.]

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See also under **Disease Headings.**

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